The INDUSTRIAL-ARTS MAGAZINE

JAN 21 1918

FEBRUARY 1914

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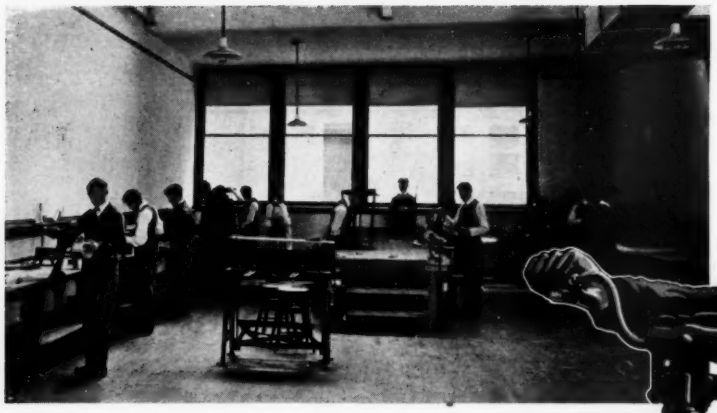

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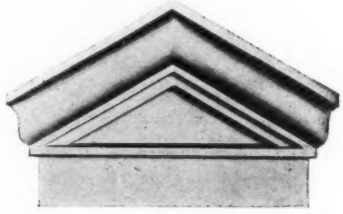

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Published Monthly by

THE BRUCE PUBLISHING COMPANY, Milwaukee, Wis.

Established 1891

FRANK M. BRUCE, Publisher

W. J. LAKE, Eastern Advertising Manager | **E. E. KRILL, Business Manager** | **H. KASTEN, Subscription Manager**

OFFICES

MILWAUKEE: 129 MICHIGAN ST. | **New York: 112 East 19th St.** | **Chicago: 64 W. Randolph St.**

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Entered January 20, 1914, as second-class matter in the Postoffice at Milwaukee, Wis., under the Act of March 3, 1879.

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Member of the Associated Business Papers and Audit Bureau of Circulations.

SUBSCRIPTION INFORMATION.

The subscription price of the *Magazine* is $1.50 per year, payable in advance. Postage for Canadian and Mexican subscriptions, 35 cents; for foreign countries, 50 cents. Single copies, not over six months old, 25 cents; more than six months old, 50 cents. Notice for discontinuance of subscriptions must reach the Publication Office in Milwaukee, at least fifteen days before date of expiration, with full balance due to date. Notices for changes of address should invariably include the old as well as the new form of address. Complaints of non-receipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

EDITORIAL CONTRIBUTIONS.

The Board of Editors invites contributions of all kinds bearing upon the Industrial-Arts Education, Manual Training, Art Instruction, Domestic Science, and related subjects. Unless otherwise arranged for, manuscripts, drawings, projects, news articles, etc., should be sent to the Publication Office in Milwaukee, where proper disposition will be made. The Board of Editors meets once or oftener each month in Chicago, and all contributions submitted are given careful attention. Contributions when accepted are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

The Industrial-Arts Magazine is on sale at Brentano's, 5th Ave. and 27th St., New York City; John Wanamaker, Market St., Philadelphia; A. C. McClurg & Co., 218 S. Wabash Ave., Chicago.

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INDUSTRIAL-ARTS MAGAZINE

Vol. VII FEBRUARY, 1918 No. 2

THE RELATION BETWEEN DRAWING AND DESIGN AND THE MANUAL ARTS

F. D. Crawshaw, President of the Academic Board, United States School of Aeronautics, University of Illinois

THE subject of art in its application to life has been so often discussed that it may seem an imposition to give it renewed consideration of a public nature. Further agitation by anyone should be regarded as an attempt to revamp rather than to review. The one who opens discussion on this subject now should do so only because he feels that past efforts in this direction have not been fruitful or because changed conditions make further discussion seem desirable.

A genuine consideration of a subject tends to admit light and should therefore be conducive to some growth. Without question the world is more enlightened today as to what art is and what its functions are than was true even a few years ago. Past discussions on art then are assumed to have been fruitful. Conditions under which we live today, however, are so different than they ever have been that what may have been generally accepted at any time in the past as substantially correct regarding art and its functions may fall far short of satisfying at this time.

It is upon the ground of changed conditions, therefore, that the subject in question is here discussed. And by "changed conditions" is not meant changes from past conditions evidenced now as the result of revolutionary activity but rather those changes from the past which are the result of evolutionary movements. It is not art in its relation to life as applicable to war times that is under consideration, but rather to art in its relation to life in the twentieth century under normal conditions that your attention is invited. Furthermore, only that part of the larger subject which is covered by drawing and design on the one hand as a part of art or the tools of art and by manual arts on the other hand as a part of life, or the means of livelihood, is considered.

One of the simplest definitions of art, and one which is particularly appropriate for use in this discussion is: "Art is the application of skill and taste to production according to aesthetic principles." A fair interpretation of this definition, it seems to me, would permit a manual art to be included as art, for to "apply skill and taste to production" is certainly the function of all manual arts. This is true whether one considers production to mean the material object which is made by the application of skill and taste in labor, or whether he means the more indirect result of applying skill and taste thru human effort, but yet the more subtle and permanent one, if indeed the more intangible one, viz: the development of character in those who make the material objects.

Again, if art is "the application of skill and taste," there must be some means by which the application is made. This manifestly is drawing or design, or both. The artistic production, in other words, materializes by means of the use of drawing or design, or both. In the case of a design which is first expressed by a drawing, as for example, a design for a piece of pottery, a chair, or a building, both drawing and design are means in the production of the piece of pottery, the chair or the building. On the other hand, a design may be expressed for the first time in material form in the final "production," as in a beautifully appointed table or room or in the combination of garments making up one's dress.

Arguing from such a point of view as that just expressed, it is easy to harp back upon the old expression, "Art for Art's Sake," and say there is no such thing. And truly this must be so if one goes a step further in the analysis and puts a particular construction upon the word "aesthetic" in the definition here used for art. We are wont to speak of art as divided into two large classes, pure and applied. We are likely to think of "pure" art as that which appeals to one's inner self; his soul, if you will. We are quite as prone to label "applied art" as that which functions in some materialistic way as, for example, the chair functioning as a means of sitting or the room functioning as a means of living. In either case, according to this construction, art, whether "pure" or "applied," is "the application of skill and taste according to aesthetic principles."

In one case, "pure" art—the beautiful picture, bit of statuary or piece of music—is a production in which the aesthetic appeals to one's spiritual self. It has the effect of lifting us out of ourselves—above the material things of life and into a higher realm. It took "skill" and "taste" to produce the picture, statuary or music. And besides, "aesthetic principles" were used in the production, providing the appeal to the spiritual was made—otherwise the production was not a part of art. It could not have been in fact, for it had no possible function except in this way or

Presented before the Manual Arts Section of the Illinois High School Conference, November 23, 1917.

in the possibly purely artificial way of filling a place as a bit of decoration. Even this would not be possible for decoration implies an appeal to the aesthetic sense.

In the other case, "applied" art—the chair, vase or room—is a production in which the aesthetic appeals to one's sense of beauty and usefulness. The object is in good form, we say. It has good lines and good proportion and it fills a material need. But it is not only useful—it must be beautiful if it is a piece of art and as such it is not related alone to human activities and occupations, but to life itself—that which makes our living more than a mere existence. One may argue, even if he admits this true, that being more than merely useful does not imply an appeal to one's inner self—to his spiritual being—but rather to his intellectual sense. This may be true, but even so there is in this confession an admission that "applied" art functions in more than a material way—it makes a deeper appeal which at least approaches the spiritual. The "skill" and "taste" used to produce an applied art product such as those ordinarily listed in the category of "industrial"arts or "manual" arts must be such as to call for an intellectual as well as a physical ability if indeed the production is "according to aesthetic principles." It is a safe hazard that when skill and taste are so applied the product will have value beyond that attached to material product—it will be more than just useful.

Now the crux of this development, whether logical or illogical, is this: The manual arts must be regarded as a part of art as well as a part of industrial production. As such they must have material values, to be sure, but more than this—they must have intellectual values and indeed spiritual values also. If manual arts are to be regarded simply as a part of industrial production, they will be swallowed up body and soul by the octopus industry and lose their identity as educative factors either in intellectual or spiritual development. Such a result would be a sad commentary upon twentieth century development for it would be an open confession that revolutionary rather than evolutionary tendencies have prevailed in producing such a result. All of the past history of the manual arts has shown that their development, however crude and ineffective, has been a part of the development of art and industry; a co-operation of drawing and design on the one hand and industrial work or manual arts on the other. To give way now to a production void of the use of aesthetic principles would be to make a possible use of skill to the exclusion of taste. Both are needed to develop a production which is more than material, one which appeals to the inner self and develops character as well as one which is for use in a physical sense.

The cry of the alarmist is not sweet music, but it may be better to reflect upon possible results before rather than after acting. The present day is fraught with danger which may result in an educational peril. We are having forced upon us by existing conditions an obsession that nothing is worth while that does not result in material things—things which are useful regardless of their beauty and their value as educationally constructive agents. This is as it should be if all our energies must be consumed in securing quantity rather than quality results. But in this process we must not lose sight of the fact that by the process we are gradually losing the place which has been occupied by us in the use of educational method. We have had intellectual and spiritual ideals in the past in our educational methods and we must continue to have them in the future. Let the manual arts function as a part of industry now and always, but let them involve thought and feeling in production. In a word, let them be not only the result of skill but of taste, also. May they have an aesthetic content.

How can such a future be insured? Perhaps by no better means than to realize the exigency of the situation. Further than this and more to the point from a practical point of view, by agreeing upon a means of making manual arts as broad a subject as possible both from the industrially practical and from the theoretically educational standpoints. To do this one must admit that whether manual arts is to function, as it should in many cases, chiefly in an industrial product or whether it is to function in a product having individual social or utilitarian value, but more particularly value in character building or as a general educational means, advantage should be taken of all possible means to make it as far reaching in the development of the individual and in his future life as possible. Certainly this calls for the widest use of drawing and design and all other co-operative means of making manual arts effective. Drawing, whether freehand or mechanical, is a manipulative means of expressing ideas; it calls for skill of hand and eye and requires mental co-ordination. Design, often expressed in a drawing, shows one's sense of the fitness of things. It can reveal the idea of the design only when the means of expressing it is a good execution.

The idea that one can develop a piece of craft work or an industrial product without giving to it his best effort in thought and in the several steps which are required for the expression of that thought in physical form is contrary to all experience except for the rare individual who may be classed as a prodigy or a genius. In the industrial world the product of industrial value is produced in great quantity by thousands of workmen who give no thought to the production except the mechanical manipulations incident to fashioning material. The one who gave thought to the production was the draftsman or the designer, who studied with minutest care every detail and who drew and redrew, designed and redesigned until the greatest finesse was expressed in the last and finally

accepted object. This was to serve as a pattern for the thousands of workmen to follow in the comparatively simple process of mechanical manipulation in fashioning material to duplicate the pattern in form only. The draftsman and designer likewise was the only individual or individuals who got that reaction which involved intellectual and spiritual exercise and uplift aside from that which may result from making as perfect as possible, by mechanical manipulation, the counterpart of a material production. Now if manual arts is to be educative in the largest sense each pupil must receive the benefits of both reactions, viz: those which come to the draftsman and designer in the initiation, and final creation of the perfect model or pattern, and those which come to the workman who produces one or many objects similar to the original model or pattern. It must be evident then that if manual arts are to survive as an educative means, each pupil must be given instruction in good draftsmanship, careful designing, and skillful fashioning of material.

If he is a skillful workman only in fashioning material to imitate in form the creation of some one else, he is a tradesman or vocational worker. Tradesmen and vocational workers are needed and in great numbers, but their training so far as possible should be given during a period following that when the larger educational process is applied to give birth to and begin growth in the widest possible development of individual capacities.

This larger educational process must be governed by the teachers of boys and girls before they are determined as to particular vocational or professional careers. It is the public school teacher in the grades and early high school years, therefore, who must have the vision of the true significance of drawing, design, and manual arts. Either teachers of drawing and design and teachers of manual arts must cooperate as they have not done in the past or else individuals must be developed and trained who can teach equally well drawing, design, and the manual arts.

No small effort has been exerted to have teachers of drawing and design and teachers of manual arts co-operate. On the whole, this effort has been unsuccessful. The physical conditions for such a cooperation in the average public school system are practically impossible. But more than this, the training of the individuals is such as to make proper cooperation impossible. The teacher of drawing and design is unfamiliar with construction in but few if any of the materials of construction and the manual arts teacher, presumably conversant with construction requirements in the fashioning of materials, is ignorant of the principles of drawing and design and often even more ignorant of their application to materials.

It would seem, therefore, that there remains but one solution of the problem, viz: to train teachers to feel, to think, and to execute in all three of the natural steps in the production of material objects such as are made in the manual arts. This will require time and attention, which has seldom been given to the training of teachers. It means an expenditure, however, which will pay large dividends not only for children who will be trained by those thus prepared, but by the world at large in the molding of opinion to govern educational practice. Americans are not only a get-rich-quick people in money matters, but in educational matters as well. Perhaps no time in history has evidenced this more than the present when every influence seems to be in the direction of making our lives worth while as measured by the quantity of material production rather than or as well as by the quality of intellectual and spiritual production.

Following this period of social and economic stress will come one of reconstruction. May it be one for which ideals of the larger life are basic in our educational methods. May those of us who can at this time prepare for the teaching of the future generation do so in a way to exemplify our conviction that after all, under normal conditions and in times when real constructive ability counts most, it is the thoro preparation for the larger things of life which has the largest individual and national significance.

A TRUMPET CALL.

A TRUMPET sings, and other songs are still;
The close-locked ranks fast gather and are gone,
Leaving a myriad stars in casements hung,
As symbols of the spirit which doth thrill
A mighty nation, as it bends its will
To aid that Cause, which Freedom must see won.
A trumpet sings; it bids the valiant—Come!
Your country calls; the laggard serves her ill.
But what of those who march not in the van.
How shall they serve who yet must bide at home?
Quick to the thousand tasks which must be done;
Each to his post—Let each now play the man.
And what for song fit for the trumpet's tone?
Why—raise the battle cry of "Carry on"!

Jan. 1st, 1918. —*James Parton Haney.*

AN EXPERIMENTAL COURSE IN CONCRETE

Henry Giese, Iowa State College, Ames, Iowa

THERE seems to be little question at the present time that concrete will gradually come into more extensive use, both as a structural material and as a subject in the curriculum of the public schools. This will be especially true in the consolidated and small town high schools and those who will try to meet the conditions necessary to come under the jurisdiction of the Smith-Hughes law by introducing courses in farm mechanics which can be included in the general courses of vocational agriculture. The course must necessarily be planned to suit the specific needs of the boy who is going out into farm work and hence cannot include highly ornamental work.

A great deal has already been said and done in regard to courses in concrete, and especially in regard to the constructive side. One need not look far to find many excellent designs of concrete projects and full instructions for making them. Not so much, however, has been said in regard to the educational side, and particularly the experimental. The majority of farm boys at the present time have had at least some little experience in mixing and placing concrete. Few, if any, however, have any definite knowledge of the underlying principles of the nature of the ingredients or their behavior after mixing. For these reasons, the writer has outlined a brief course of experiments intended to bring out some of the points that are otherwise not emphasized.

The general purpose of such a course should be to promote more intelligent use of the material at hand, not simply from the side of the actual mixing and finishing of surfaces, but also in the underlying principles of the nature of the aggregates, plain and reinforced concrete. It should tend to correct the prevalent errors and opinions as to the how and why of proportioning concrete mixtures, and the value and proper methods of reinforcing. In this light, a course in concrete construction would be of definite vocational value in that it would promote a more intelligent use of a material of great importance to the farmer, it would give him a knowledge not to be obtained from ordinary sources, and also stimulate him to further thought and study along that particular line. Contrary to the usual opinion, this class of work does not require much equipment that cannot be found in schools teaching agriculture.

The scope of such a course might be about as follows:

I. Testing of ingredients.
  A. Testing of cement.
    1, specific gravity.
    2, fineness.
    3, soundness.
    4, normal consistency.
    5, time of setting.
    6, effect of packing on volume.
  B. Testing of aggregates.
    1, hardness (kind of rock; granite, limestone, shale, etc.)
    2, percentage of sand and gravel in bank run.
    3, size of sand grains.
    4, percentage of silt in sand.
    5, percentage of voids in sand and gravel.
    6, effect of moisture on the volume of sand.

II. Testing of cement products.
  A. Mortars.
    (A comparison of mortars of varying strengths from neat cement to as lean a mixture as would be practicable to make or use; for example: neat cement, 1:1, 1:2, 1:3, 1:4, 1:6. As the results of this experiment are purely comparative and not absolute the specimens might be either tensile, compressive or bending.)
  B. Plain concrete.
    (A comparison of various concrete mixtures in a manner similar to that used in the testing of mortar except that the ratio of cement and sand remains the same thruout the experiment, say 1:2, and the amount of gravel varied.)
  C. Reinforced concrete.
    (A comparison of the various kinds and sizes of reinforcing material and the proper methods of placing the same.)

While it would be possible to carry on cement tests in the high school shop, it is not to be encouraged for the following reasons: (1) The rigidity of inspection at the factory to meet competition and the requirements made by The American Society for Testing Materials and other societies insure a fairly reliable product; (2) the personal element enters very largely into cement tests and hence such tests as might be made in the high school would not be of any great value, and (3) such tests are out of the realm of farmwork and would prove of little interest and value to the high school boy.

The situation as regards aggregates, however, is entirely different. Concrete aggregates (sand, gravel, stone) are not a product of manufacture as is cement, nor is it generally subjected to tests by specialists, but is found in different conditions and used largely as it is found. Investigations show that many cases of poor concrete are due to poor aggregates. A few well chosen experiments would show, more conclusively than a great deal of talk, the effect of poorly chosen aggregates or improperly proportioned mixtures.

Since concrete is strong in compression but very weak in tension, the subject of reinforcing becomes a very important one when it comes to making fence posts or any other projects that will be subjected to bending stresses. How many people understand the proper placing of reinforcing rods? A few simple tests with beams having reinforcing in different places, give quite definite ideas as to the most effective placing.

The outline of the course mentioned above follows:

LABORATORY EXERCISES.

(Experimental Work.)

Exercise No. 1.

Percentage of Sand and Gravel in Bank Run.

Purpose of experiment. Sometimes it seems desirable to use the sand as it comes from the bank. This experiment is intended to show whether this can be done with profit. Most bank run contains too large a proportion of sand for the gravel.

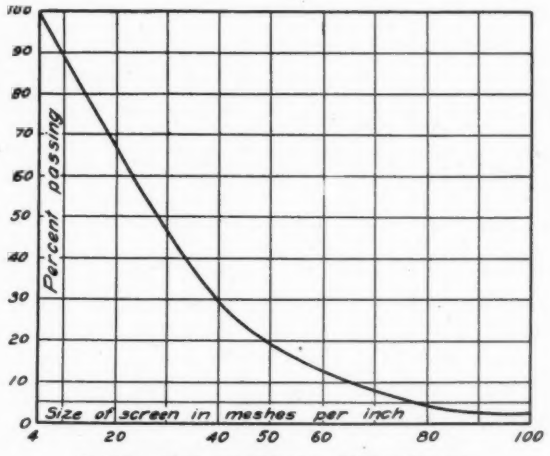
Necessary equipment. (1) Metric scales. (Avoirdupois will do but metric is more convenient for figuring percentages.)

(2) Small sample, or better, several samples of different gravels as they come from the bank.

(3) Small sieve with ¼-inch mesh screen.

(4) Pans to hold gravel.

Method. Weigh carefully 1,000 grams of bank run and sift thru ¼-inch mesh screen. Weigh separately the quantities retained and passing the sieve. (The purpose of weighing both is for checking results.) The number of grams in either case divided by 1,000 gives the percentage. For example, if 624 grams pass thru and 376 are retained, then 62.4% is sand and 37.6 is gravel. There should be for an ideal mixture about twice as much gravel as sand. Why? This is fairly typical of a great many banks. The bank run should be sifted and regraded if good results and an economical use of cement are expected.



SIZE OF SAND GRAINS
Fig. 1.

Exercise No. 2.

Size of Sand Grains.

Purpose of experiment. If sand is too fine, a richer mixture is necessary to give the same strength. This experiment is intended to give some indication as to whether this is necessary.

Equipment necessary. (1) Metric scales.

(2) Sand left from experiment No. 1.

(3) Sieves with 20, 40, 60, 80, 100 meshes to the linear inch (sizes commonly used in agricultural classes.)

(4) Pans to hold the sand as graded.

Method. Weigh carefully 500 grams of sand left from experiment No. 1. (That is the material that has passed thru the ¼-inch mesh screen.) Place in the 20-mesh sieve and sift until a considerable shaking fails to shake any more thru. Weigh the amount of sand retained and passing. (Both are weighed as a check to see that all is accounted for.) Figure the percentage by dividing by 500. Register the percentage passing. The amount retained on the 20-mesh screen may now be thrown away, as it is of no further use in the experiment. Screen the sand passing the No. 20 sieve thru the No. 40 sieve in the same manner as before. After this is done, screen thru the remaining sieve in order No. 60, 80, 100.

Take a piece of cross section paper or make chart similar to illustration given and lay off equal distances on the bottom and call these as indicated in Fig. (1) for the No. 4, 20, 40, 60, 80, 100 mesh screens respectively. Lay off equal percentages from 1 to 100. Plot points corresponding to the percentage passing each screen; for example, to begin with, sand was taken which had all passed the ¼-inch mesh screen. On the same line with the ¼-inch screen and at the 100 per cent mark, make a slight mark to indicate the proper point. Now to take an arbitrary example, suppose that 67 per cent passed the No. 20 screen. Plot this in the same way on the line extending upward above the No. 20 screen. In the same way locate the other points as found. After all are located, draw a curve that passes thru these points. This curve represents the gradation in size of particles of sand. Notice where this curve crosses a line half way between the No. 40 and No. 60 screen, on what would be the No. 50. Not more than 20 per cent should pass the No. 50 screen. Also not more than 5 per cent should pass the No. 100 screen. If these quantities are exceeded, more cement should be added to give the same strength.

Exercise No. 3.

Percentage of Silt in Sand.

Purpose of experiment. Sand that is too dirty should be washed. This experiment is intended to give some indication as to the amount of silt present.

Equipment necessary. (1) Metric scales.

(2) Sand.

(3) Pans for holding sand.

(4) Some means for heating sand to dry it.

Method. Weigh out 500 grams of sand to be tested. Place this in a rather deep pan. Put in enough water to more than cover the sand and wash by shaking the pan. A circular motion gives good results. The dissolving dirt will cloud the water. Allow to settle about 20 seconds to prevent pouring off the fine sand particles and then pour off the water. Repeat this operation until water is clear. (This usually takes from twenty to thirty washings.) Dry the sand thoroly by heating and then weigh again. (If sand is weighed in the pan be careful to deduct the weight of the pan.) Subtract the weight of clean sand from the weight of dirty sand and divide the difference by 500. This gives the percentage of silt, which should not exceed three or four per cent.

Exercise No. 4.
Percentage of Voids in Sand and Gravel.

Purpose of experiment. An interesting experiment that can be carried on in connection with the theory of proportioning is that of determining what percentage of the volume of gravel is voids and also what percentage of the volume of sand is voids. This gives something tangible as to the proportions of cement, sand and gravel necessary to make a dense mixture.

Equipment necessary. (1) Two 200 c. c. graduates.

(2) Sand and gravel to be tested.

(3) Water.

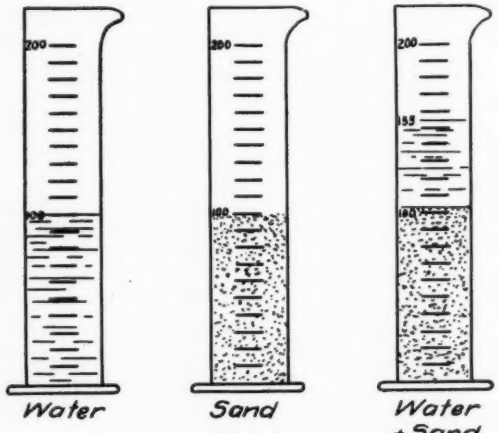
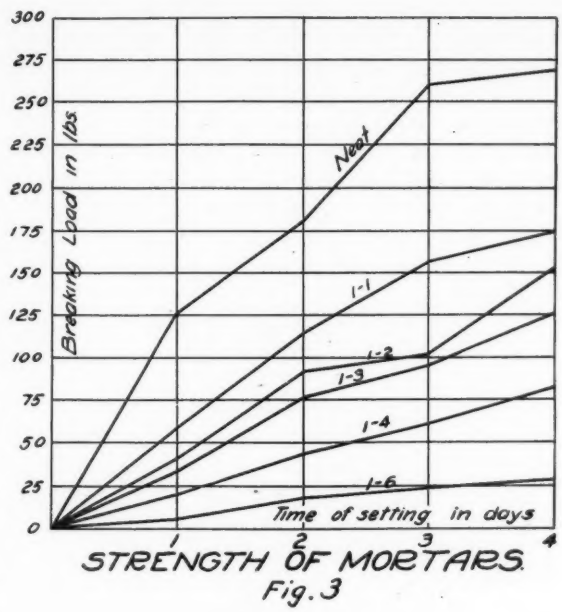


Fig. 2.

Method. Fill one graduate with sand up to the 100 c. c. mark and the other with water to the c. c. mark. Now pour the sand slowly into the water. Do not pour the water into the sand. Why? When you have poured all of the sand into the water, read the scale on the graduate to see how many c. c. of mixture. Two hundred minus the number of c. c. of mixture gives the percentage of voids or air spaces in the sand. Why? This experiment can also be made with gravel. The results will not be quite so accurate, tho, with such a small graduate as if larger ones are used.



STRENGTH OF MORTARS
Fig. 3

Exercise No. 5.
Strength of Mortars.

Purpose of experiment. Many people do not understand the relationship between the proportioning of cement and sand in mortars and the resulting strength. This experiment gives a good comparison of the relative strengths of varying proportions.

Equipment necessary. (1) Sand.

(2) Cement.

(3) Scales for weighing sand and cement.

(4) Trowel.

(5) Mold for molding beams 1″x2″x12″. (Design given, Fig. 5.)

(6) Machine for testing beams. (Design given, Figs. 6, 7, and 8.)

Method. Mix enough mortar of each of the following proportions to fill five molds: Neat cement, 1 cement to 1 sand, 1 cement to 2 sand; 1 cement to 3 sand; 1 cement to 4 sand; and 1 cement to 6 sand.

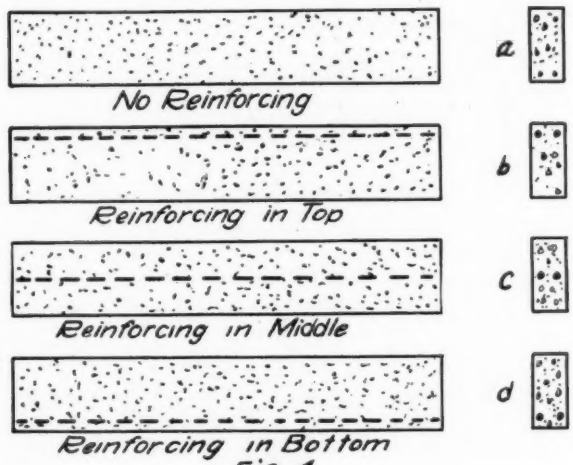
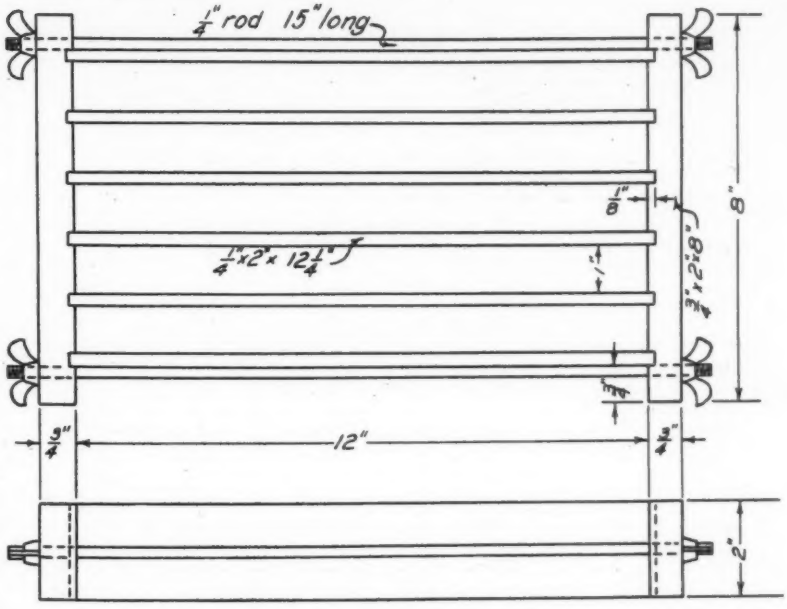


Fig. 4.

After these have been allowed to set 24 hours, break one of each kind in the testing machine and tabulate the results. Continue these experiments each day until all beams are broken, or better still, leave the last set of beams to set a week before breaking. Plot the results obtained in the form of a chart similar to the one given in Fig. 3. This chart shows very clearly the comparative strength of the mixtures and also the rate at which that strength is gained. Care should be taken in mixing, placing and curing the beams. Study the lessons on mixing concrete. Lay the mold on a board and partially fill with mortar. Pack the mortar by pressing with the thumbs. Fill the mold completely, pack again and smooth off with a trowel. Place a board over the mold and turn mold over. Remove the board from this side of the mold. Fill up if necessary. This packing from both sides eliminates, to a large extent, defective beams. Allow the beams to stand 24 hours and then remove from molds and place carefully in a tub of water. The ideal way to cure concrete is to let it set 24 hours in moist air and then several days in water about 70° Fahrenheit.



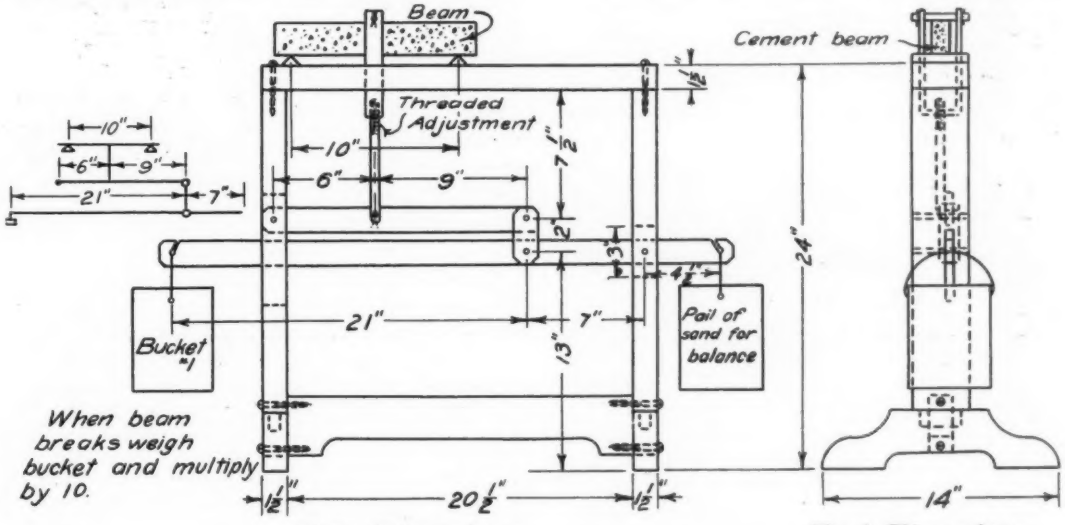
Mold For Concrete Test Specimens
Fig. 5

Exercise No. 6.
Strength of Reinforced Beams.

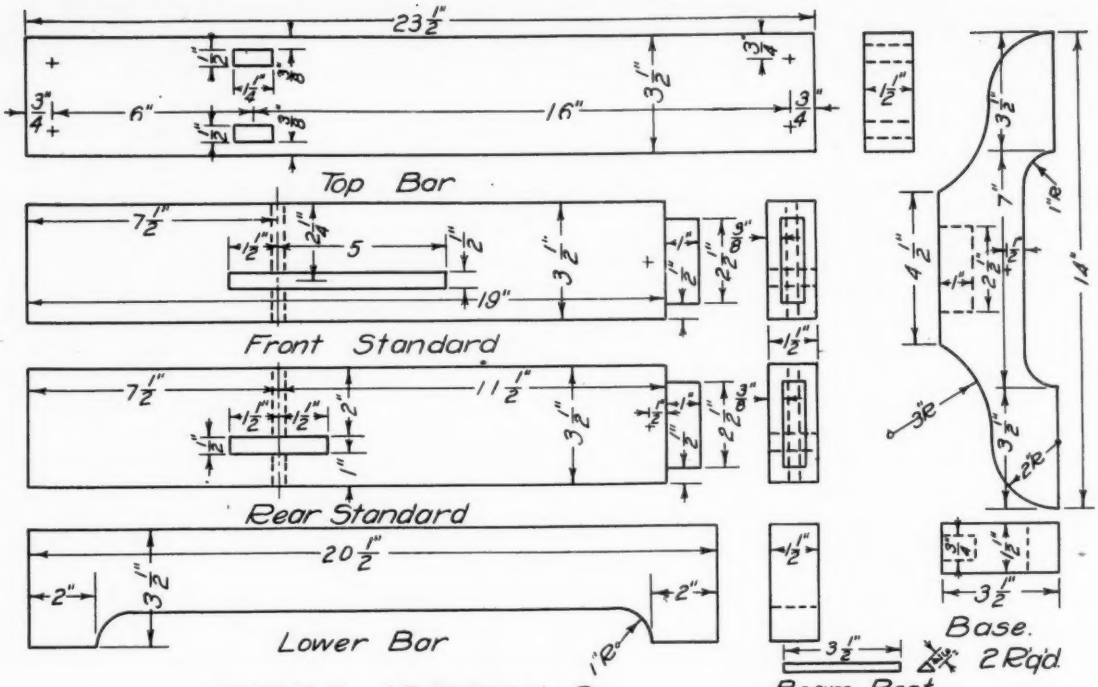
Purpose of experiment. This experiment should accompany the classwork on the theory of reinforcing and is intended to show the effect of using reinforcing as well as the proper place in which to put it.

Equipment necessary. The equipment used in Experiment No. 5 will do for this experiment except that several feet of No. 14 iron wire will also be necessary.

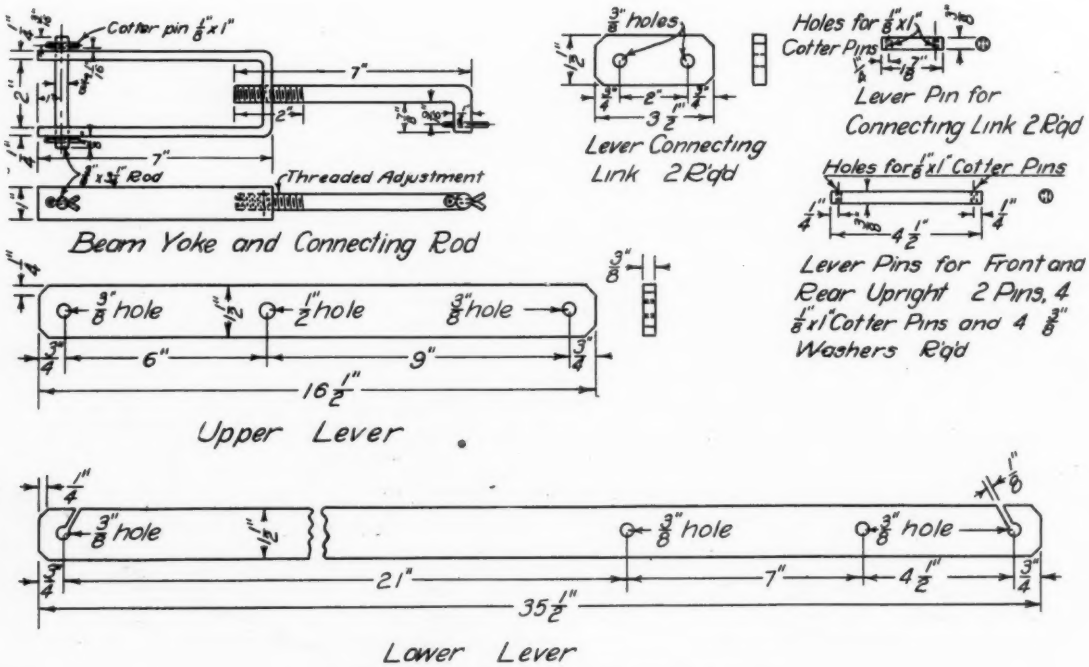
Method. Mix enough mortar (one part cement to three parts sand) to fill three beam molds. Cut and straighten six pieces of the No. 14 wire each 11½ inches long. In filling the three molds, proceed as in experiment No. 5 except as follows: In No. 1 put about ¼-inch of mortar in the bottom and then lay



CEMENT TESTING MACHINE
Fig 6



WOOD DETAILS.
Fig. 7


Cotter pin 1/8 x 1"
Threaded Adjustment
Beam Yoke and Connecting Rod
3/8" holes
Lever Connecting Link 2 Req'd
Holes for 1/8" x 1" Cotter Pins
Lever Pin for Connecting Link 2 Req'd
Holes for 1/8" x 1" Cotter Pins
Lever Pins for Front and Rear Upright 2 Pins, 4 1/8" x 1" Cotter Pins and 4 3/8" Washers Req'd
3/8" hole
1/2" hole
Upper Lever
Lower Lever

HARDWARE DETAILS
Fig. 8.

two wires in the mold as shown in (d) Fig. 4. Then fill the mold and cure as in experiment No. 5.

Make beams No. 2 and No. 3 in the same way except as indicated in (b) and (c) of Fig. 4.

Allow the beams to cure at least one week before breaking and break all the same day. Be sure that the beams are right side up so that the reinforcing is in the proper place. This experiment is very convincing as to the proper position of the reinforcing. Plot the results as in Exercise No. 5.

"SEE WHAT OUR BOYS MADE!"

Clarence E. Howell, Supervisor of Manual Training Public Schools, Jacksonville, Fla.

IF pictures could talk, what tales they might sometimes tell! Here is one that looks perfectly innocent; in fact, the scene is rather a pleasant one. But it took 20 boys just about 1486 hours to forge the links of the chain looped along the edge of the boulevard. There are approximately 800 links, or an average of 40 links to a boy. How much increased educational value, or valuable technical skill, was each boy gaining after he had passed his tenth link, or his twentieth, or his thirtieth?

Looks nice when it's all up, and the school officials can point with pride, saying, "See what our manual training boys did in the shop!" You know; you've all heard them. It looks good to them, but what about the effect on the boy?

Do you know what the instructor of this class said to me, when I visited him in his shop? "I'm having a cinch this semester. All I did the first of the semester was to show the boys how to weld a link, and they've been at it ever since. I just stand around and watch them."

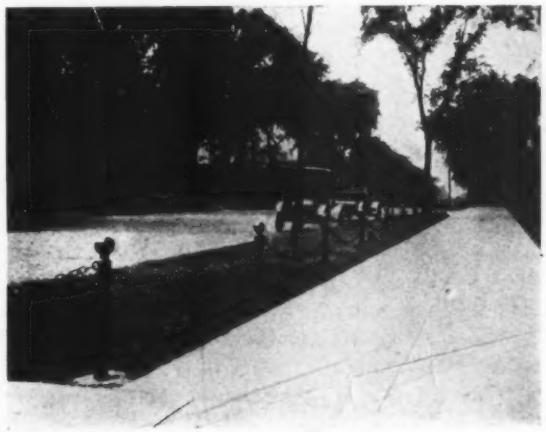
This may be an unusual case, but it certainly is a striking illustration of shop instruction of a "practical nature" carried to the very extreme, and, when I hear of first semester freshman high school classes in woodworking having "made their entire shop equipment, complete," I'm not so sure that the above is an unusual case, either. There are some things that we all know the novice can't do and do right, and there certainly is legitimate room for suspicion of some of the wonderful things that a green student is sometimes said to have made. I cannot help feeling that we sometimes give way to the very desire for showy results which brought about the above decorative chain.

In the chain case, however, the teacher was not to blame; indeed he was very much disgusted with the whole thing, but he was under orders from the business office, and the superintendent of schools. Supervision in this city had been dispensed with as superfluous, so there was no supervisor to shield him. I find, according to the printed report of the schools, that, a year or two previous to this, when they had had supervision, the work done for the schools of the city amounted to a total cost for materials alone, not allowing anything for labor, of $653.23, nearly one-half of all the work done in the manual training shops. By this means the per capita cost of the work had been reduced to 43.9 cents per student per year, including both the high school and the grades, a very low average when compared with that of other cities, and going to show that the school system was at that time getting good financial value from its shops, and receiving very material co-operation. Yet, immediately supervision was done away with, the school officials were not content until they had forced the teacher to reduce the work of the students to the laborious level of forging by hand, in coal forges, long chains which could have been much more cheaply bought outright, machine made.

A good many such incidents have been brought to my attention, off and on, but this is the first one I ever took the trouble to get evidence on. I made up my mind to follow it up. I asked the teacher to keep track of the time, and secured the picture and the figures submitted herewith. I am glad to pass them on in the hope that they will visualize some of the errors we are liable to, and some of the absurdities of school officials and school boards, in their demands upon the manual training shops.

Let it be borne on the flag under which we rally in every exigency, that we have one Country, one Constitution, one Destiny.
—*Daniel Webster.*

In the measure in which thou seekest to do thy duty shalt thou know what is in thee. But what is thy duty? The demand of the hour.—*Goethe.*



The Fence.

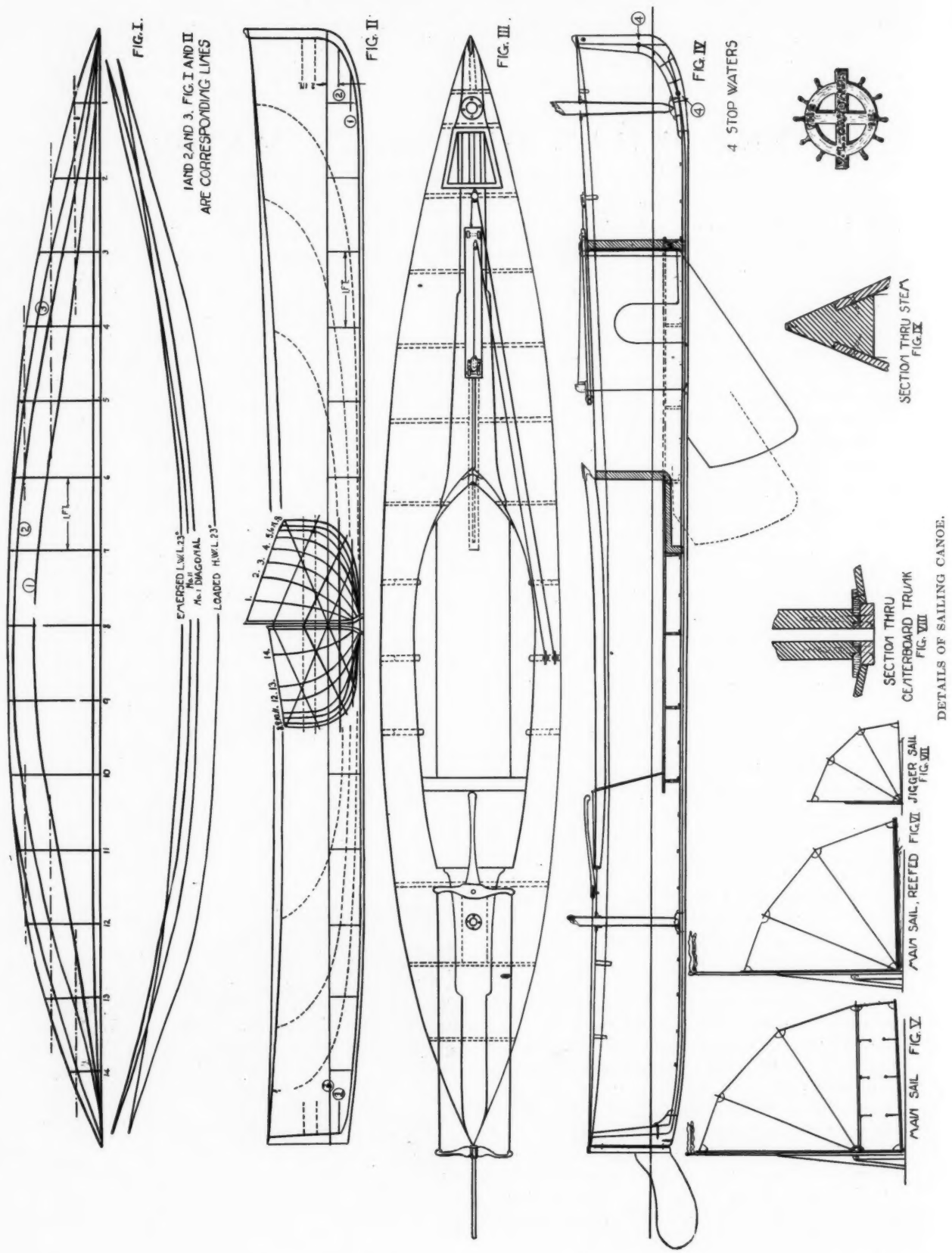


FIG. I.
I AND 2 AND 3. FIG. I AND II ARE CORRESPONDING LINES
EMERGED L.W.L. 23"
No. 1 DIAGONAL
LOADED H.W.L. 23"
FIG. II
FIG. III
FIG. IV
4 STOP WATERS
SECTION THRU STEM FIG. IX
SECTION THRU CENTERBOARD TRUNK FIG. VIII
MAIN SAIL, REEFED FIG. VI
JIGGER SAIL FIG. VII
MAIN SAIL FIG. V

DETAILS OF SAILING CANOE.

THE MAKING OF A SAILING CANOE

Nicholas Majerus, Franklin High School, Seattle, Wash.

THE reason perhaps amateurs do not try boat building more than they do is because there are technical difficulties which seem to throw a barrier in the way.

In the July number of *The Industrial-Arts Magazine*, 1915, I told how a motor boat was built in the manual training department of a Seattle high school. The purpose of this article is to tell how a two-passenger sailing canoe was built by Vernon Gardner, a junior in the same high school. The canoe was designed, the parts were cut to shape, then assembled and finished entirely by the pupil. It cost him two hundred hours of his time and thirty dollars, which is one-third of the price of such a canoe.

The boat is fifteen feet long, thirty-eight inches wide, fourteen inches deep and clinker built with a pit two feet by two and one-half. The keel and posts are of oak, the planking and deck are of Washington cedar, the combing and minor trimmings are of mahogany, the boat is finished thruout a natural color except the bottom, which is painted.

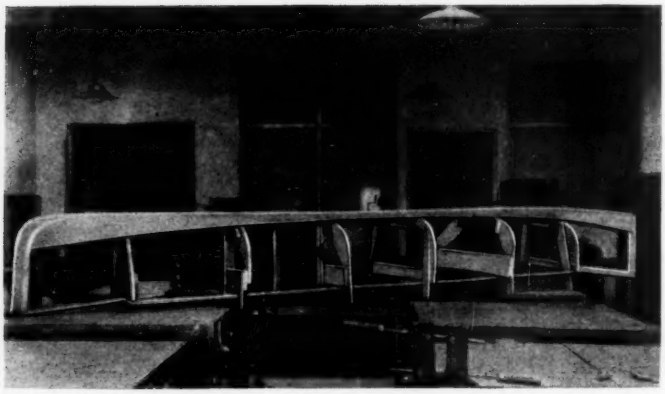
The first thing which was taken into consideration in the building of this canoe was the design. Here our chief concern was that the boat when finished would be a seaworthy craft. After examining magazines and books, visiting boat manufacturing plants and consulting with boat builders the design as shown in the drawing was decided upon.

With this data at hand a drawing was made to scale. Next came the laying down, that is, the enlarging of parts of the drawing to full size, and this drawing was used as a pattern for the various parts that are needed in the construction of the framework. The second drawing being completed the molds were made, seven in number. These were made of scrap pieces of lumber which were bolted together and then sawed to the correct shape, Fig. II. Next a flat oak keel was made as shown in the drawing, four inches by seven-eighths inches. The keel is four inches wide in order to give strength and also allow sufficient width for the center-board to go thru it. The slot in the keel is one-half inch wide and five feet long to admit the center-board and the head ledgers. The keel batten, which is the strip nailed on top of the keel, projects beyond the latter one-half inch (see Fig. VII), thus forming a rabbet on each side. The stem (for construction refer to Fig. IV and IX) was sawed out and planed up three inches thick and rabbeted so that the ends of the planks would come flush on the sides of the posts. Next the center-board trunk was put in (get location from Fig. IV and VII). The head ledgers, which form the ends of the trunk, are of oak one and one-half inches wide and one-half inch thick. Then a groove one-fourth inch wide and one-fourth inch deep was cut on each side the entire length of the opening for the sides of the trunk to fit into. The head ledgers were fitted into place now. A one-fourth inch shoulder on the ledgers rests on the keel. The remainder of the ledger goes on thru the keel. The sides of the trunk, which are composed of one-half inch cedar boards, have a tongue fitting into the one-fourth inch groove and are fastened with copper rivets. All the joints in the construction so far were given a coat of white lead before they were fastened together.

The molds were now placed at equal distances after a small piece had been cut out of each to fit over the keelson flush with the boarding line. They were then tacked to the keelson and further held by ribbands one-half inch by one inch, one nailed to each side the full length of the frame work. Next the keel was turned uppermost and stem, stern post and molds were plumbed and shored firmly. Stop-waters were now put in to keep out any water that might otherwise cause a leak by following a seam. Stop-waters are small plugs of dry soft wood. The holes were bored where the joints cross the rabbets as shown in Fig. IV.

The rabbet which was partly made in the stem, stern post and keel before assembling same, was now completed with a chisel. A strip one inch by one-fourth inch by five feet or more in length was used as a guide. This guide was held across the molds lengthwise of the boat. One end of it was applied to the rabbet, then the wood was cut away until the surface of the strip and the outside of the stem and stern coincided. In this way a good fit for the garboards was obtained.

The positions for the ribs were next laid off, six inches apart. This marking was done at the top and bottom of the frame and in such a way that the markings could be seen from the inside or outside when the planks were on to avoid putting rivets thru the planking at the location for the ribs. The riveting at those places was completed when the ribs were put in. The planking came next. In order to avoid distorting the shape of the boat the planking had to go on in such a way that only a limited amount of strain from one piece would come upon any other. The planks are Washington cedar one-fourth inch thick, four inches wide and they all run the full length of the boat. A fit cannot be obtained by springing the planking edgewise. Strakes are sometimes "sprung on" by experienced builders but amateurs should not attempt it, for the chances are that the framework would be pulled out of shape. The garboard, that is, the plank nearest the keel, was laid first. It was clamped down to the center mold with a hand screw and the ends were bent down so that the plank touched all the molds without being bent edgewise.



The Canoe in Course of Construction.

In this position the garboard was measured up in order that it could be cut to fit properly in the rabbet of the keel, stem and stern post. The garboards were fastened by boring small holes into the keel, three in each space left for the ribs, and copper rivets were inserted two inches apart to hold each garboard in place. Brass screws were used in stem and stern, the planks were always drawn up to a snug fit with clamps, and not with the screws or rivets, to avoid splitting the boards. All the planking was steamed before fastening same in place. A description of a steaming box and how to make it is given in *The Industrial-Arts Magazine* for July of last year. All the calking that was used in the boat was in the rabbets of the keel, stem and stern posts. The calking was soaked in thick white lead before it was applied.

Next it was calculated how many planks it would take to cover one side of the canoe. None of the boards when fitted have parallel sides, so in order to have every board reach the full length of the canoe it was necessary to determine beforehand the width of each one at its ends. To have the lapping properly done between ends and fit edgewise at stem and stern each board was fitted and cut separately. In this canoe the planks lap five-eighths of an inch between ends, and in nearing the ends the boards are beveled; at the stem and stern the fit is flush and there is no lap.

In planking, the boards were placed alternately on each side and thereby both sides were planked at the same time, so to speak. When the planking was finished the canoe was turned right side up and the keel blocked to the proper rocker. Fig. IV.

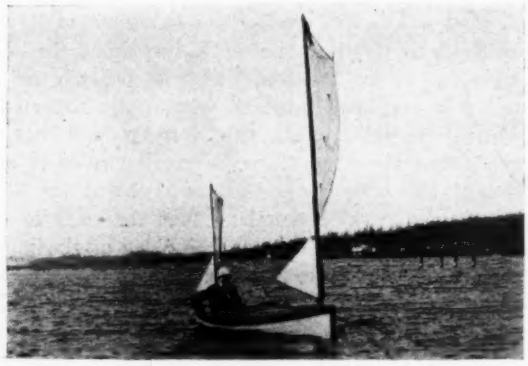
The holes for the rivets to hold the ribs were now located with a batten which was bent at the proper location for the ribs and used as a guide to get the correct alignment. Next the ribs were cut to dimensions one-fourth inch by three-eighths inch from straight grained white oak. After they had been steamed they were put into place while hot and later riveted fast. The riveting was begun at the keel and continued to the top of the boat. As many ribs as possible were put in before any molds were removed. It is customary to leave the molds near the bulkheads in, but instead they were removed and extra two-piece ribs were inserted, the bend being too short to allow for a single piece.

After all the ribs were in and the gunwales fastened on, the molds were removed. The boat was kept from spreading by means of cross-spalls which were fastened to the gunwales. The gunwales, which were made of fir one inch by three-fourths inch, support the cross beams of the deck and serve as a chafing batten protecting the sides of the boat. They were fastened with a rivet in each rib, stem and stern post.

Next the steps for the mast plates were fastened to the keel fore and aft. Then the deck beams were cut with a crown of three inches, giving ample stowage space below the deck and making the curve sufficient for the boat to free itself quickly from a wave. The beams are fastened to the gunwales. They are one inch deep and one-half inch wide, except the beams that support the masts, which are four inches wide in order to take a two-inch hole for the mast tube.

Before putting on the deck the floor was laid. It is customary to place the floor boards directly on the timbers, in that way giving more room below deck but allowing the water to cover the floor if there should be a leakage or if a wave is shipped. In this plan the floor is raised two inches, in that way keeping stores dry even tho there is water on board. The floor is carried on beams one and one-half inches deep by one-half inch wide fitted closely to the planking. Limber holes are cut in each piece to permit a free passage of water. These boards also help to strengthen the canoe.

After the floor was laid the deck was put on. An opening for a cockpit two feet by two and one-half feet was left, which gives ample room for two passengers. The deck is of Washington cedar, laid in two pieces one-fourth inch thick with a seam down the center which is neatly covered with a one-fourth



The Canoe in Use.

inch by five inch mahogany strip. The side decks are supported by six braces or knees on each side sawed from spruce one-half inch thick and screwed to the planking and gunwale. A hatch was cut thru the deck and a cover was made to fit it. Fig. III.

Next the combing was put in place, which is mahogany one-fourth inch thick, three inches high forward and one and one-half inches aft. The front comes to a point and the after end is square. It is riveted to the side braces and the deck.

Now a few words in explanation of the center-board. The first essential of a sailing boat is its lateral resistance, by reason that it can be sailed to windward. For a canoe a keel or a center-board is necessary. A center-board was used in this canoe in preference to a high keel for the following reasons: First, the boat with a center-board can be turned more easily; second, it will stand upright in shallow water; third, it permits easier landing; and fourth, there is less danger of running aground because the center-board can be raised in shallow water. The question of the weight of the center-board is important. Sailing canoes require some ballast and with a center-board the weight can be carried lower than in a canoe with a keel. This particular board has a drop of sixteen inches. Fig. IV. It is made of galvanized sheet iron three thirty-seconds inch thick, contains two square feet in surface area, weighs thirteen pounds and is of such a type that it can be moved forward or aft with a little car to carry it. Fig. III. The car was made of a mahogany board twenty-four inches by three and one-half inches by one-half inch; it has four wheels one and one-fourth inches in diameter and two pulleys, one to let a rope down vertically thru the board and the other to carry a rope horizontally to the fastening at the cock pit. Fig. III. The rope carries most of the weight of the center-board.

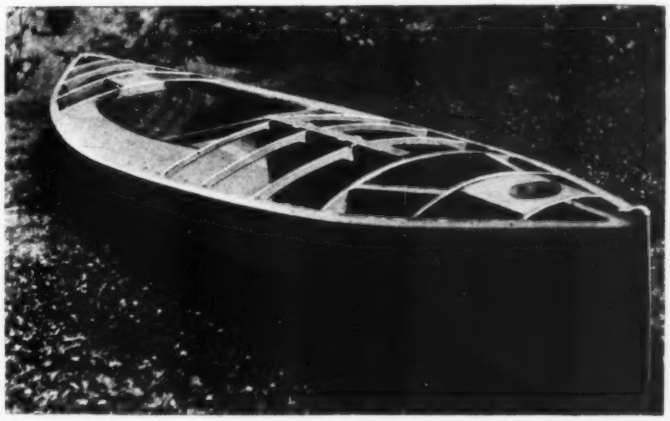
The rudder is made of mahogany three-eighths inch thick, eight inches wide and eighteen inches long. The rudder steering arm is cast brass. Ropes from the steering arms transmit the motion from the tiller, which is just aft of the cockpit and in front of the mizzen mast, to the rudder.

It is necessary to have a seat of some kind in a canoe, but it should be as low as possible in order to keep the weight low.

Before the mast plates, cleats and screw eyes were put in place the boat was given two coats of boiled linseed oil; after the oiling the bottom was painted and the rest finished a natural color, but received three coats of exterior varnish.

The question naturally arises how large a sail or rigging a canoe should carry. This is determined by making a comparison of other boats. The chief elements, however, are the personal qualities of the canoeist, his prudence or good judgment, daring, agility, and skill in handling a canoe. One man may use one hundred square feet while another would not be safe with half that amount. On the canoe built in my classroom, main and mizzen have a combined area of sixty-five square feet, fifteen in the mizzen and fifty in the main mast, which also has a patent reef. In a canoe the sails should be spread well fore and aft, long and low, rather than narrow and high, for the propelling power will be as great and the keeling power much less. In order to obtain a proper balance of the sails the center of effort should be nearly in the same vertical line with the center of the lateral resistance of the keel. With regard to the general shape of the sails I refer you to Figs. V, VI, VII.

At the close of school the canoe was completed. After launching same all anticipations were realized; the canoe sailed perfectly at a good rate of speed and has proven itself a seaworthy craft. During his vacation the pupil had the pleasure of spending his leisure in the sailing canoe he himself had made. An ambition realized, two credits earned, and a happy summer over, he sold his canoe for twice what it had cost him. But he is not minding the loss of the canoe too much, for already he is planning to build a twenty-four foot launch next semester.



The Completed Canoe.

DRAWING IN THE HIGH SCHOOL

PLANT AND OTHER NATURE FORMS

Beatrice Cannon

(Second Article)

IN placing this topic next it is not necessarily meant that it is next in importance; in fact, in this series of papers the chief reason for the order adopted is that of convenience in obtaining material, or making use of the special interests or enthusiasms of the pupils at certain times. For instance, in the autumn when most of us are beginning our school work, such a wealth of material for nature study can be found that it is well to use it then in classwork, especially as the pupil is not limited to the schoolroom specimens but can obtain a great variety of types for himself. Classes beginning in mid-winter would have this work somewhat later when the spring specimens are available. In the autumn plant study also is the great opportunity for collecting design material to use when the holiday season is approaching, as the desire to work out things in material at that time brings an especial interest into craft problems. Other forms of study seem to follow easily when these conditions do not exist.

Even the first work from plants should satisfy both the interest in Representation and Design as follows:

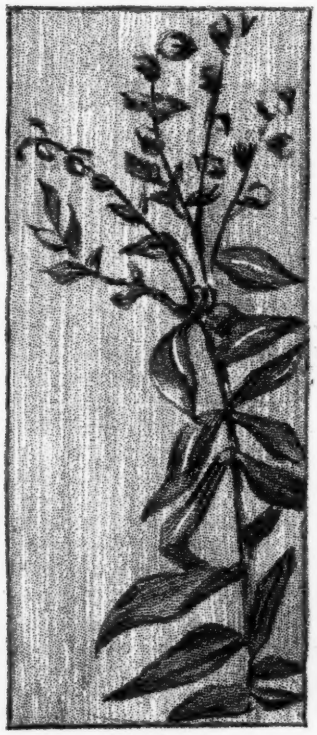


Fig. 1, Plate 1.

Representation—
- Line.
- Light and shadow.
- Perspective.
- Pictorial composition.

Design—
- Pictorial composition.
- Decorative composition.
- Adaptation to surface ornament.
- Suggestion from historic ornament.

Since pictorial composition feeds both the interest in Representation and Design it makes a good starting point, and should be developed in both directions. Composition in this work consists in the selection and arrangement of material in carefully considered spaces with suitable margins. A special reason for placing it first is that the pupil will thus be made to do more thinking for himself, than by the method in which the teacher does the selecting and composing, and the student's work is practically limited to copying what is put before him.

Fig. 2, Plate 1.

Medium recommended—soft pencil or charcoal, the latter preferred as more flexible since the pupil is to be encouraged to experiment. The following is a general statement of the way in which this plan has been used with satisfactory results in beginning high school classes.

The material (any flowers, leaves, branches, etc., available) was placed in several jars about the room, and the pupil told to make his own choice of subject. To simplify the problem and to save him from the confusion of a crowded composition he was limited to three or four blossoms with their leaves and stems; the drawing paper was 9x12″ and a margin required. Just here came a direct application of our

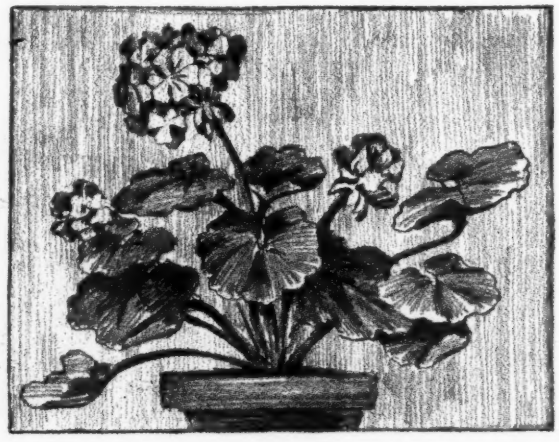


Fig. 3, Plate 1.

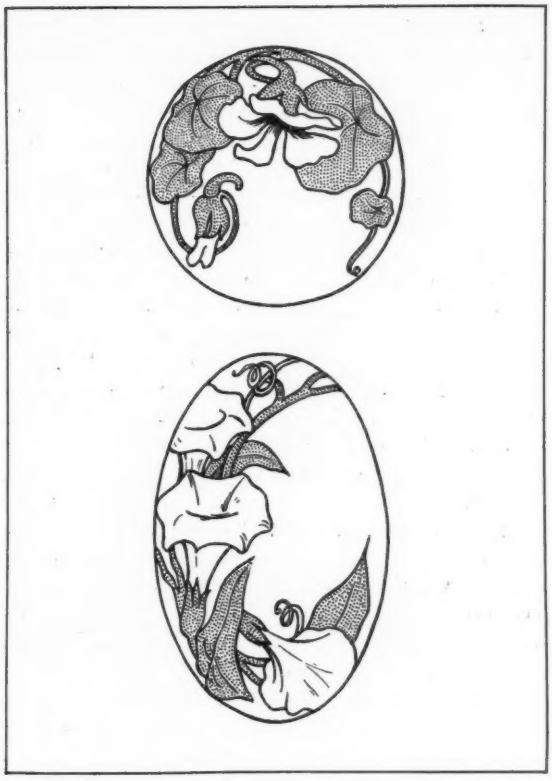


Plate 2.

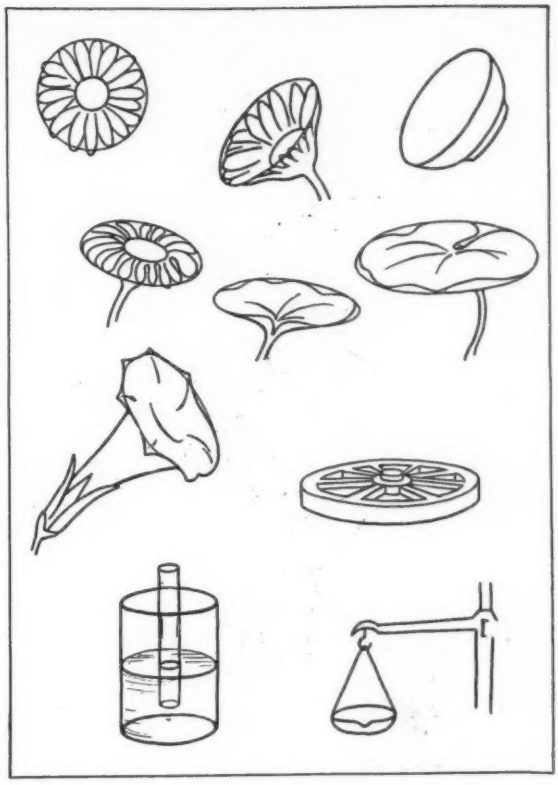


Plate 3.

preceding discussion of rectangular spaces, for the margin of course was not to be drawn for itself; but rather some well proportioned rectangular space, chosen for its suitability, and then placed as pleasingly as possible on paper; which might or might not result in equal margins all around.

Here also comes the first forcing of the pupil to consider fitness and to use judgment as to well related spaces. For, before he can decide on a suitable shape for his composition, he must carefully consider his material. If he chooses something of a delicate growth and vertical stalks he will need a space to correspond. If the plant is branching, broad and sturdy in growth, he will need a space quite different, perhaps becoming square or nearly so; and fitting either of these, or being more adaptable, some satisfactory intervening proportion. (See Plate 1.) Later he may be encouraged to see how some plants suggest rounding spaces and are adapted for good arrangement in oval, circular or semi-circular spaces. (See Plate 2.)

The next step is a massing of values, light, dark and middle tones, followed by a class criticism. By setting aside the ones which appeal to the majority, and then analyzing them for reason why, they may quickly be led to some appreciation of balance of value, and of a certain pattern relation of background spaces and flower and leaf spaces. By constant attention to relations of this sort, there is established a logical connection between free hand work and design where too often a pupil feels a complete break in the subject. Some of the unsuccessful ones should next be put up for suggestion for improvement, and then all drawings returned for correction.

When the difficulties of composition have been fairly well overcome, there should follow a somewhat closer study for better form—working still on the same drawing—but with as many quick sketches for experiment as may be necessary. For one thing, the perspective of circular forms has a very logical place here, illustrated by flowers and leaves in various positions, and also by circular jars, bowls, etc. For, altho we separate these essentials into topics for convenience and clearness in discussion, no opportunity should be lost in the classroom to show their interdependence to catch all the possible threads of interest at any point and weave them together. So it is well worth while to introduce as illustrative material here, other things than plant form, even to circular constructions from the shop, wheels, etc., and examples from the laboratory. It is somewhat helpful for the boys of the class to discover that the drawing of their cherished shop constructions and their fascinating scientific apparatus involves fundamentally the same consideration as the drawing of a daisy or a vase. It makes them vastly more patient with the latter. There is further interest to those whose inclinations are more toward the sciences than toward the arts in learning to sketch certain types of botanical forms easily. (See Plate 3.)

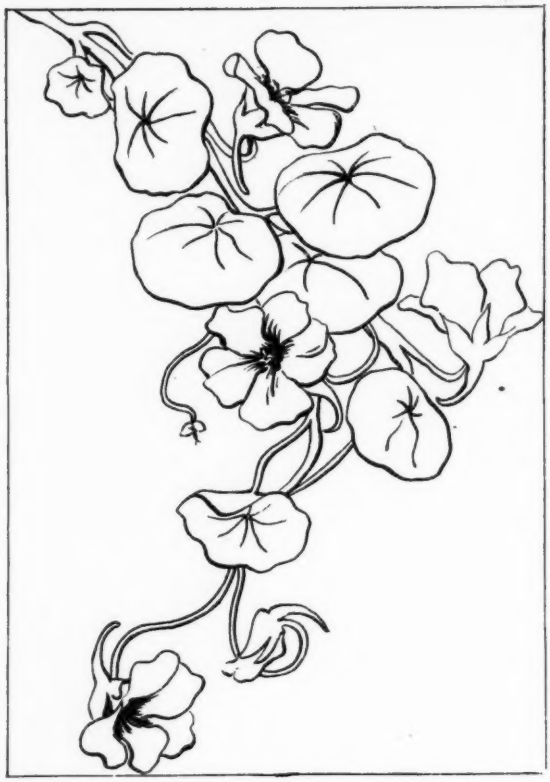


Plate 4.

After the class had finished this part of the work, so that in addition to an intelligent composition, better drawing had been attained, the next step was a careful drawing from a single spray or stalk in outline. This work was done with soft pencil and for a two-fold purpose; (a) the perception and appreciation of the grace and delicacy of line which exists everywhere in nature, (b) the collection of detail for design work. (See Plates 4 and 5.)

There are many practical reasons why outline drawing should receive definite attention in the high school. The student has a right to expect that his work in drawing adds to his efficiency as well as to his appreciation. He is already needing the skill and deftness of the pencil in the shop and in the science classes where working in masses with uncertain edges is of no use. And as in writing if he is ever to use this tool with ease and precision, he must have continual opportunity to practice.

In order that this drawing from plants in outline may yield the most benefit to the pupil, both in developing appreciation, and in increasing skill and accuracy of hand and eye, it is necessary to show him what to look for; to call attention to the characteristic growth of various specimens—the delicate and subtle curves of one, and the fuller, more circular quality of another. Incidentally almost without its being mentioned, there comes from this a perception and love of beautiful line for itself regardless of what it may represent. This is, however, so good a place for handling in a concrete way the quality of rhythm as manifested in line, that we made an effort in that direction. A little later, in design problems, the necessity for unity of idea is perceived with comparative ease, as is also the value of variety giving elements as a relief from monotony; but the pupil's grasp of rhythmic relations seems to be more vague unless he is given some tangible evidences of it to hold to while he finds his way.

The study of characteristic lines of growth in plant life yields this at once, and the attention only needs to be directed a little for the pupil to perceive its relation to space arrangement as illustrated in various kinds of composition; landscape, figure, Japanese prints, and pure design. These were all used in a purely illustrative way, and the pupil was asked at this point to make quick sweeps of line indicating the type of rhythm represented in his specimen, and to keep these with his careful line drawing which followed. (See Plates 6 and 7.)

Details for Design.

Next came the drawing of details as faithfully as possible for use in design—flower, bud, leaf, stem, seedpod, tendrils—in all sorts of positions; followed by the adaptation of this material to the practical uses of surface ornament. (Plates 8 and 9.)

Here some explanatory discussion was necessary, of pictorial treatment and decorative treatment of material—their points in common and their essential difference. It is not difficult to make the pupil see

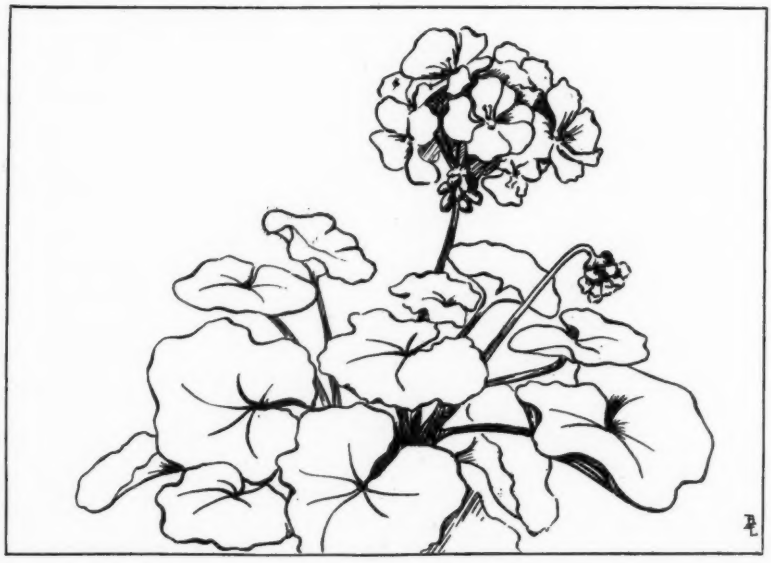


Plate 5.

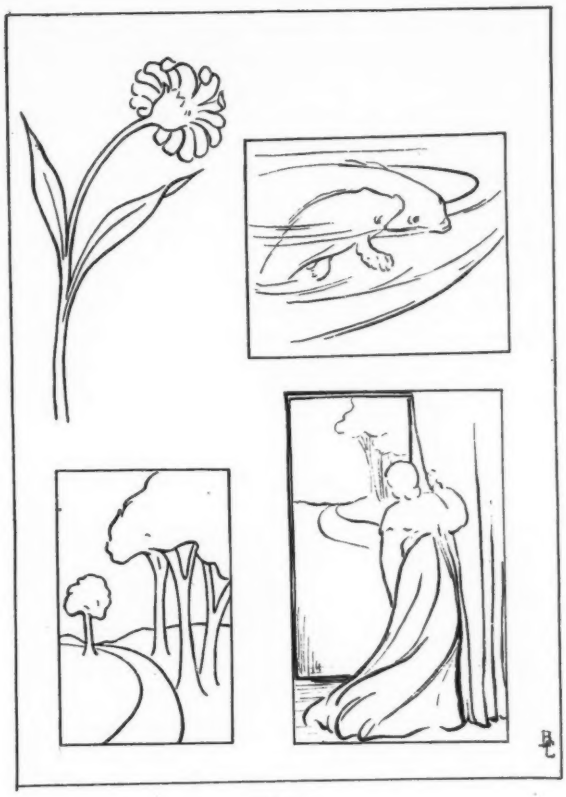


Plate 6.

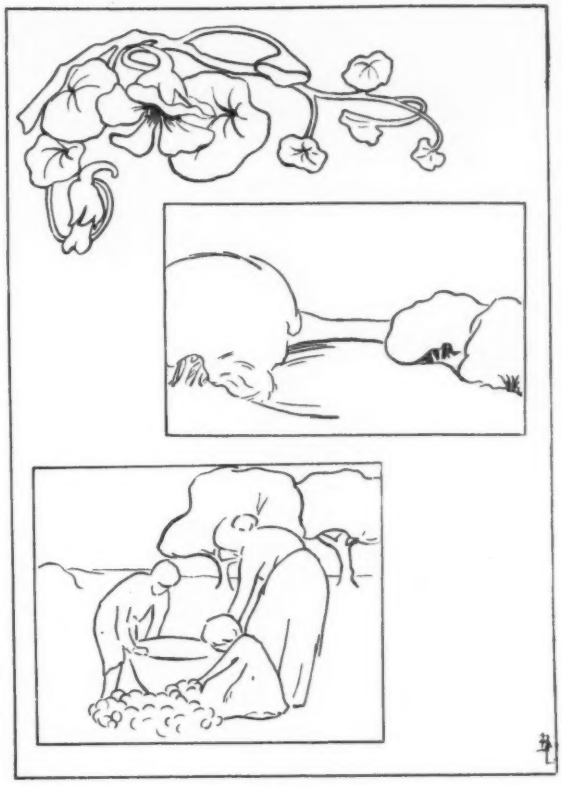


Plate 7.

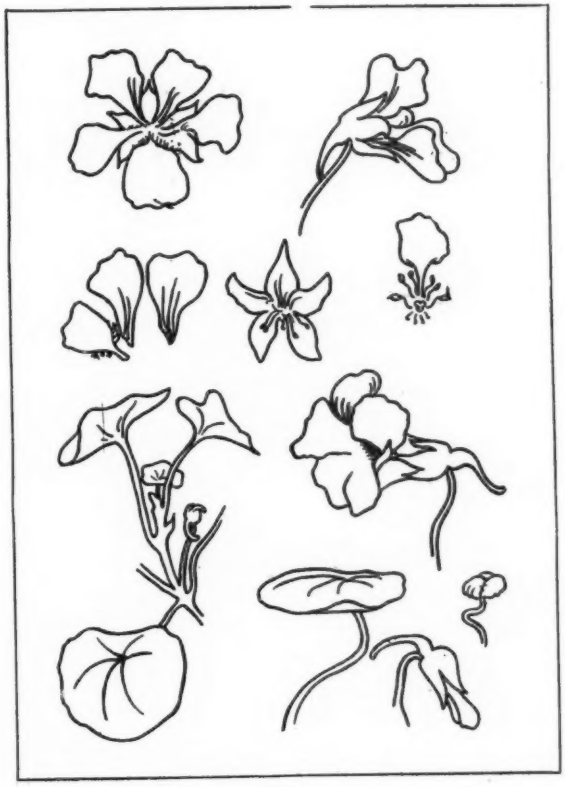


Plate 8.

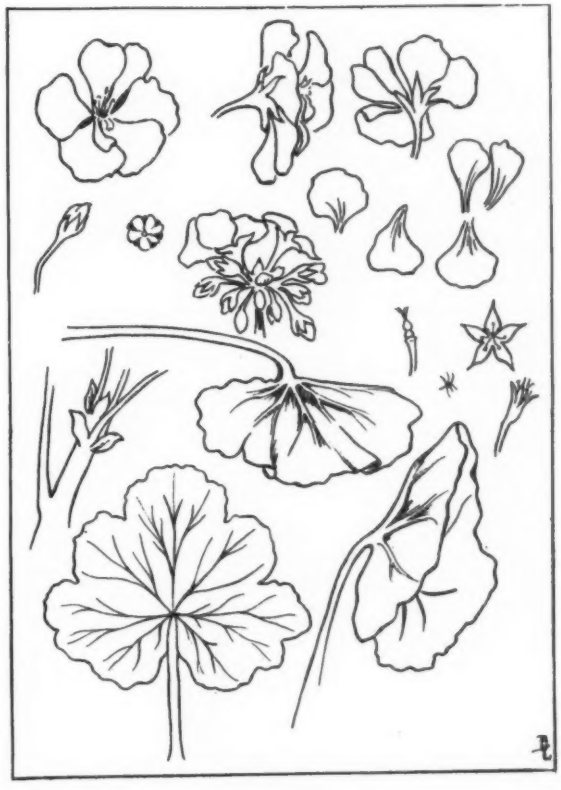


Plate 9.

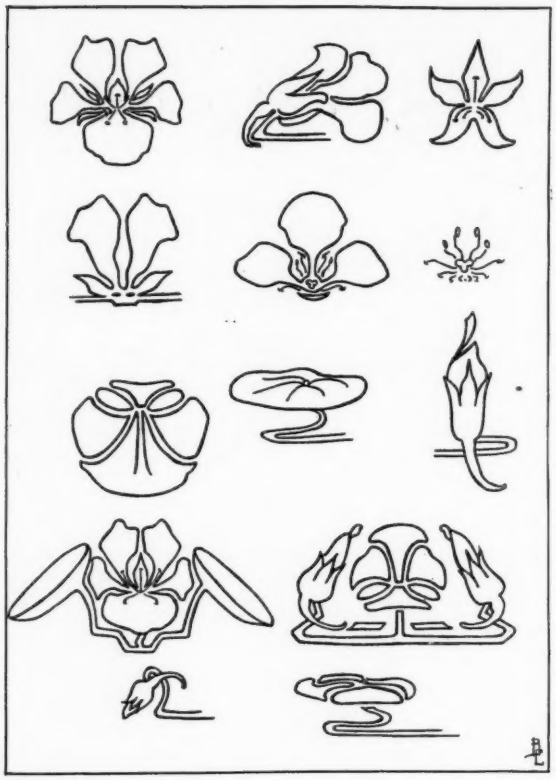


Plate 10.

that insofar as the question of space arrangement is to be considered, (relation of objects to background shapes, lines, etc.) even pictorial representations include design and are decorative. To be a pleasing pictorial composition, a drawing must have very positive decorative elements; but it may be an accurate representation (for example, a botanical drawing) and have neither pictorial nor decorative value.

However, when it comes to the ornamentation of flat surface (walls, floors, fabrics, book covers, etc.) something different is necessary. A design applied to any surface must appear to be a part of that surface, belonging absolutely to it, never standing out; and when this is thoroly understood, there will be an end to naturalistic treatment of flowers, fruit, etc., for such purposes. "The third dimension." The roundness, the standing out quality which is legitimate in pictorial work, must be eliminated to render the material fit for flat surface decoration. So our plant details must be reduced to flat symbols. Whether or not our symbols shall retain a recognizable relation to our plant form depends on the use to which it is to be put. Considered from the standpoint of decoration there is no reason for such fidelity to facts. We may use our plant form so freely that many experiments with its various suggestion may lead us far from our starting point. Natural forms of all sorts lend themselves wonderfully to our individual interpretation in the endless variety of form offered in different stages of growth and in different positions—all rich with fresh suggestion once we focus the attention upon them.

Adaptation, or the process of translating some natural form into a shape suitable for surface decoration, presents problems in which the pupil requires very definite aid. The flat symbols are sometimes used as units in design, or they are combined to form more complex units.

Adaptation to Decorative Use.

When first asked to produce these units or to adapt a natural form, the pupils are usually at sea, and very definite direction of work is necessary. In these classes we first made a series of units from plant details, by reproducing the form minus its irregularities and with a perfectly symmetrical arrangement of all its parts. (See Plate 10.) Next the same forms were worked over, retaining certain irregular features which seemed beautiful, but retaining them symmetrically; then we tried simple combinations of these shapes, two or three leaves together in various combinations, blossom and leaves, blossom and buds, etc. (See Plate 10.) Further variety was obtained by transposing the units just made into straight line or angular units. (See Plate 10.) Some of these were at once perceived to be grotesque but in many cases the beautiful forms showed a new aspect and emphasis, and the whole exercise tended to make the class much more free in their experimentation.

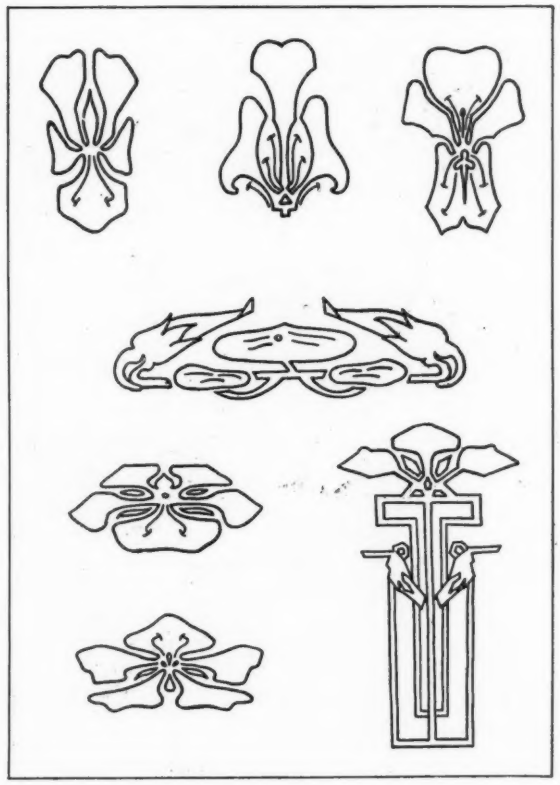


Plate 11.

Further trials were made by changing the emphatic direction of line in the units; showing them with vertical forms exaggerated, then the horizontal made dominant, and then changing to an oblique emphasis. (See Plates 13 and 14.) Sometimes it is well for the teacher to illustrate this whole process of adaptation on the board, using some plant which the class has not drawn. These steps help them to see in natural forms a vast source of inspiration, and are wonderfully stimulating to their imagination and invention. (See Plates 13 and 14.) Miscellaneous units from students' notebooks.

Closely related to plant form especially in yielding decorative material are birds, animals, and insects; and tho it may not be convenient to work from life, specimens are usually available from the science department and pictures also may be used. Where possible this material should be utilized and the pupil made aware of its value. Japanese prints are a valuable aid here as in many other places. We have used this material practically in designs for covers and title pages of notebooks for zoology, for embroidery designs for craft work in metal stenciling and block printing. (See Plates 15, 16 and 17.)

This work of collecting and studying material, was followed by designing for definite spaces and purposes. It is of course desirable that as much as possible of the design work be carried out in material, and it is essential that at least some of it should be;

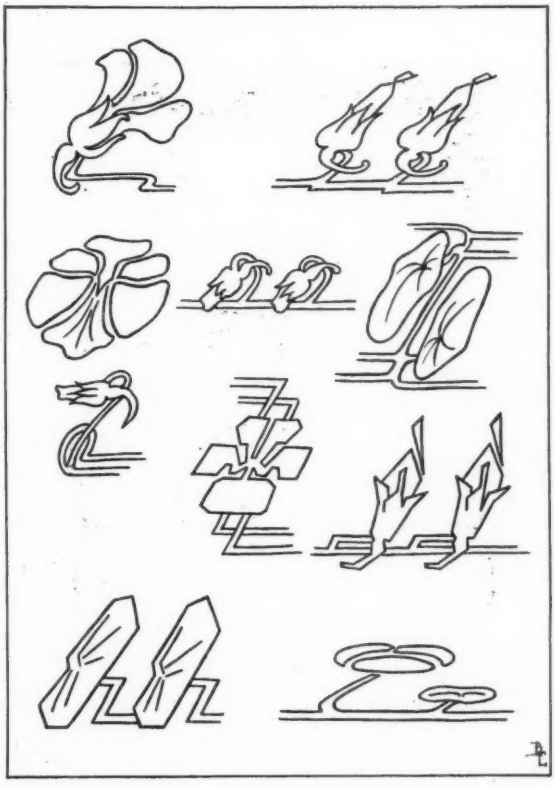


Plate 12.

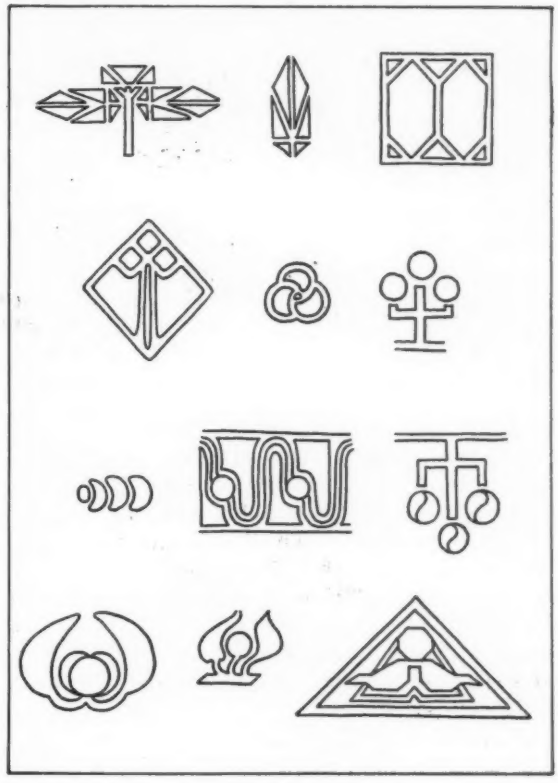


Plate 13.

but it is practically inevitable in our crowded school courses, that there will not be time for as much of that as we would wish. Wherever there is equipment for any special craft work the special interest of the design class should be directed toward making designs suitable for that sort of application, and the pupil should be especially impressed with the necessity of considering the nature of the material in planning the design; to illustrate with an extreme case, a design that is good for a bit of metal or leather work would be entirely unsuitable for embroidery or weaving and very likely impossible to execute.

As it will generally not be possible to work out in material all designs, it is well to make some experimental designs in what might be called standard spaces; spaces which constantly occur in all sorts of places where decoration might be used; for instance, the corner and border, and the limited spaces such as the square, circle, and rectangle. (See Plate 16.)

In beginning this the reminder of the necessity of emphasis on structure of lines is needed, of frank acknowledgment of limitations. In borders on rectangular surfaces, for instance, the important direction is horizontal, so the units chosen for the connecting links of those units should have the horizontal movement. On the other hand overemphasis produces a monotonous and unpleasant effect. Here again we have the question of unity and variety where we must steer between monotony and confusion to produce a properly rhythmic whole.

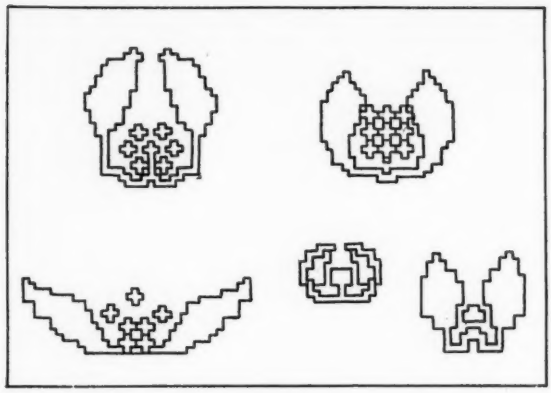


Plate 14.

One or two examples discussed by the class in connection with some of their efforts will help them to grasp these points. They will also see quite readily that the requirements of an all over pattern are quite different, the case demanding an equal tendency to lead in all directions, altho there is a choice in whether emphasis is to be given the vertical, horizontal, or diagonal direction, and this choice must be made after the purpose of the design is known, whether it is for wallpaper, door, or fabric. This is a good place to illustrate the inherent qualities of these directions; the reposeful quality of the horizontal line, the dignity of the vertical, and the suggestion of restlessness, energy, or motion in the oblique. These should be illustrated for them by pictorial, decorative, and architectural examples.

With these aids of his judgment and imagination, he might be left free to make a design from his own units for an all over and a border. The turning of the corner of the border is an especially good piece of training, for it emphasizes the need of keeping the whole idea fluid, so to speak, ready to run into structural mould and be adapted thereby. The easy running space suddenly takes a new direction involving a right angular edge and an increase of space lower down; and the units must be adapted to the new conditions, yet without losing the continuity of the border.

This border and corner problem we have sometimes applied in the making of a simple paper portfolio and decorating the outside, adding the necessary lettering. When the class has made stenciled articles there were numerous applications; curtains, table covers, sofa cushions, mats, book covers, etc.

The study of one plant in this way, i. e., from many varying points of view, results in certain gains which are specific and positive.

First, that plant in its ordinary aspects has become a permanent possession; and can be drawn in its usual positions from memory and has been made the means of discovery of similar beauty of line elsewhere.

Second, this thoro acquaintance with one plant so easily leads to knowledge of related plant forms

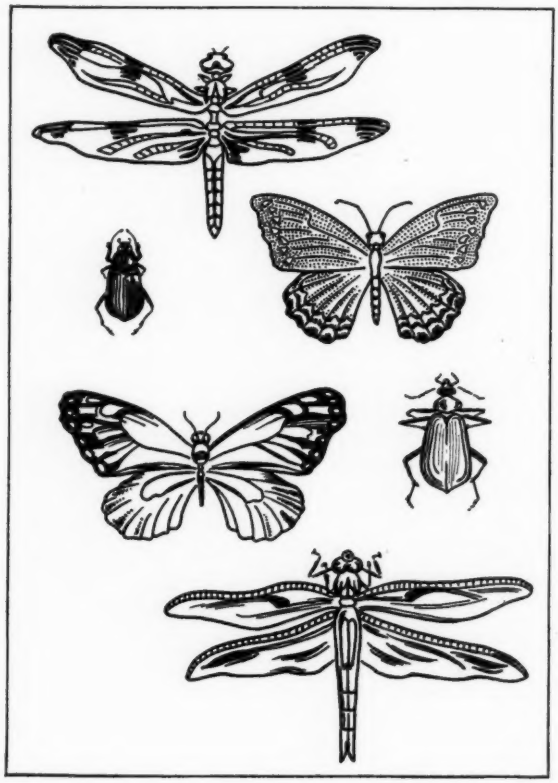


Plate 15.

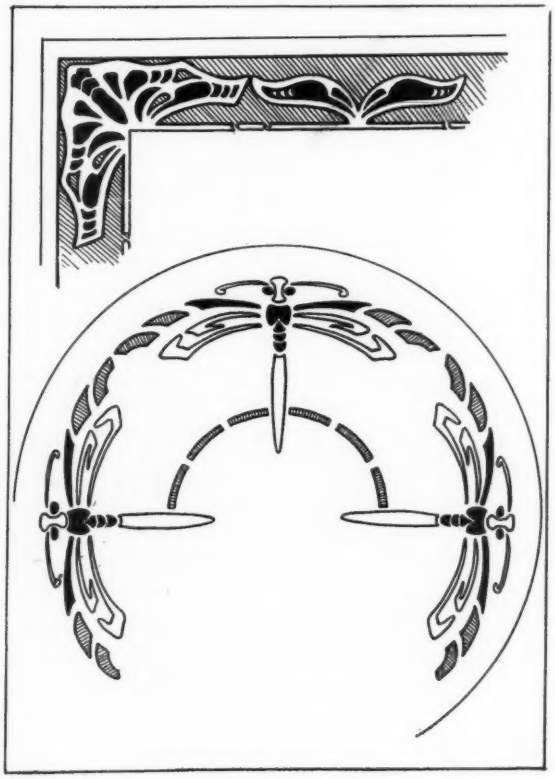


Plate 16.

that it speedily enlarges the field of appreciation and of usable material. For instance, flower used in Plate 6 is a wild flower of the prairies, a yellow daisy, differing from the other varieties in color and the leaf form. During the class work someone mentioned this difference; pictures were brought in, sketches made, so that some pupils who were studying this plant added both leaf forms to their detail drawing. At the same time the cosmos bloom and the aster were being studied by other members of the class, and the majority learned, unconsciously, the chief characteristics of all; because of some similarities and other striking differences. All have flowers circular in form with petals ranged in orderly fashion around a center with the difference of the number and shape of the petals; the aster in a fringy composite clump, the cosmos with square serrate edge, the daisy with rounding points to narrow curling strips. The leaves learned were the two types of daisy leaf, the aster leaf related to the ragged daisy leaf in form tho more robust in its growth and then the contrast of the delicate fringe of the cosmos foliage, which was yet found to have an arrangement much like the veining of larger leaves. Tho each member of the class carried only one plant thru all the stages required, it is certain that most of the class gained a fair working knowledge of several related plant forms.

Third, a pupil is induced to take his own sketches of plant form thru a set of exercises so definite that he can see exactly how he is getting each result; and can further see that he is simply working variations on the natural beauty before him, making it suitable for special materials and uses. If he can be led to do this once understandingly, there is rarely any further reluctance in adapting any natural forms to decorative uses. The play element begins to enter in and when he will "play" with the forms the proper sort of originality will develop.

Plate 18.

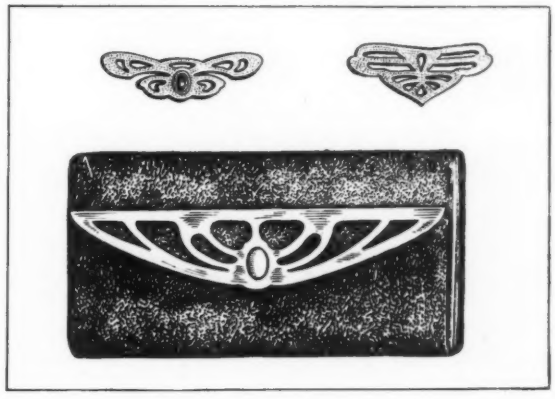


Plate 17.

CORRELATION OF TRADE DRAWING WITH ACADEMIC SUBJECTS IN A PREVOCATIONAL SCHOOL

H. E. Taylor, Paterson, N. J.

THE purposes to be achieved by the addition of trade shops and drawing rooms to a grammar school are three-fold. They may be stated in the order of their importance as follows: To apply and vitalize the work of the academic subjects; to guide the pupil in choosing a vocation, and to give a measure of trade training.

From this it follows that the chief emphasis in the curriculum should be upon the side of general education and not upon the more highly specialized industrial training.

The trade drawing classes in a school organization of this type may be regarded as the link connecting and relating the instruction in English, science, arithmetic, and civics to the various shop activities.

It is universally recognized that the work in drawing should proceed upon nearly parallel lines with the shopwork. The boy should have sufficient instruction in drawing to enable him to make and read working drawings of the projects he completes in the shop. Only in this way can he receive a well-rounded apprenticeship in any line of mechanical work.

Trade drawing is classed as a vocational subject and naturally the greater part of the time will be consumed in making sketches and drawings which have as their aim the acquisition by the student of the technique of drawing, or else a shop project as a motive. In this there is the danger that the chief aim of the school, i. e., general education, will be lost sight of, and will not receive the time in the drawing room which the teacher, I believe, can well afford to give to it.

While handicraft and drawing are not new to the boy when he enters the seventh year of school, trade drawing in the sense of being a vocational subject is new. Much of its technique and applications to the shopwork are difficult for the boy to grasp. If he can make his applications to something with which he is familiar, and which has been a gradual growth as English and mathematics have been, it will lend interest to the work and help him to grasp the necessity of having a good technique and facility.

There is probably less danger of failing to apply the work in arithmetic than any other subject. The student must constantly use the fundamental processes in spacing views, locating center lines, checking dimensions, etc. His knowledge of fractions and their manipulation becomes more concrete thru using various scales such as full size spaced in eighths and sixteenths and the one-half size, one-quarter size and smaller scales to which he sometimes draws his models or lays out the projects. He may be given sketches dimensioned in decimals and required to convert these into common fractions and make the drawing using a table of decimal equivalents. Taking measurements with a micrometer is an excellent exercise in the practice of decimals, especially if the teacher uses a chart similar to the one shown below to explain the scales.

The various plane figures and solids to which he has been introduced become something more to him than a picture on a certain page in the arithmetic. He has drawn the circle and discovered for himself the relation between its parts. He has constructed and measured angles of various sizes; has defined and used the terms chord and tangent; in short, has laid a good foundation for future lessons in more advanced mathematics.

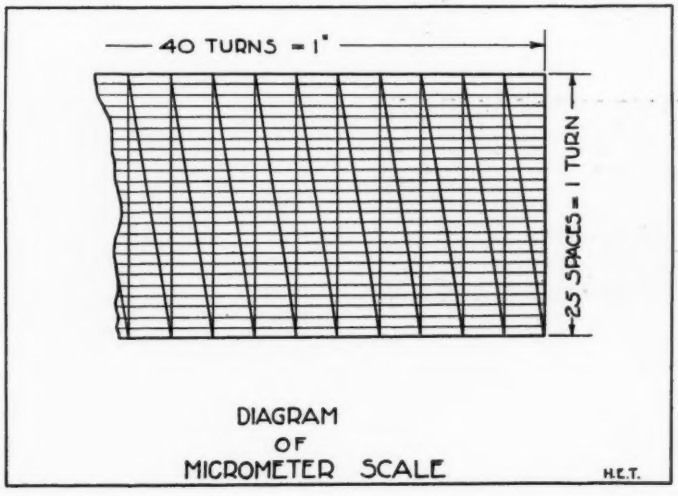


Fig. 1.

The draughting room should prove a source of considerable enrichment to the student's vocabulary. Many new terms, such as "projection," "isometric," "eccentric," "protractor," etc., are defined and used and many terms with which the student is familiar take on new meanings.

These may be used as a basis for spelling and composition. Common abbreviations, capitalization and arrangement of titles and notes may be profitably taught in the trade drawing room.

Freehand and mechanical lettering are an important part of the trade drawing course, and they may be effectively correlated with all of the academic subjects. I know of one teacher of Eng-

lish who has found it of advantage to have wall charts with such inscriptions as "Is it I?" "It is I," "Watch your speech," etc., which have been made in the trade drawing class, placed before the pupils.

Charts such as illustrated below may be used in the civics class and be found to present our governmental organization in a very striking way.

Such projects as these large charts may profitably be handled by using a group of boys from a certain grade, dividing the work as evenly as possible among them, and having the chart made at the time the subject matter is studied in the classroom. They may be made in different styles of lettering and serve as a very complete lesson in mechanical lettering.

The organization of a double session school with its rotating program offers a wide field in which the draughting room can assist. There are charts covering the room assignments of the elementary and grammar schools, of the physical training activities, of the out-of-school time in park, auditorium, library, etc. These call for a good style of freehand letter with careful spacing and ruling of the sheet and a tracing on cloth or paper from which blueprints are made. These charts are subject to frequent revision and may either be traced with the lines on one side of the sheet and the lettering on the other so that they may be changed without defacing any of the line work, or a new chart may be made for each change. The first method approaches more nearly to commercial practice and the second offers more opportunity for the pupil to obtain skill in lettering.

A certain amount of time may be devoted to map drawing, say a period once in two weeks, in which small scale maps may be made by the entire class or a grade, or several boys may co-operate in making a wall map, using different colored inks or crayons. In connection with this, they may be shown examples of commercial map and survey drawing with arrangement of titles, styles of lettering, symbols, north points, etc., discussed.

The instructor in trade drawing can well afford to devote a little of his class lecture time to the field

Fig. 3. Charts and Maps made in the Author's Class.

Fig. 2. Charts made by Students.

of industrial geography. The production of the materials for and manufacture of pencils, the various papers, tracing cloth and drawing ink are excellent subjects for brief talks.

He should not neglect to apply the principles of science to the projects as they are developed.

A knockout key for a drill collett may illustrate the wedge. Leverage, friction, strength of different materials, specific gravity, expansion and contraction may all be discussed in connection with the design of some simple machine to be made in the shop. From sketches made of the shafting, pulleys and belts in the machine shop, or of a woodworking lathe, the relative speeds of the pulleys and the mechanical advantage obtained may be computed.

Blueprinting is always a very interesting feature for the boys, and under this head may be discussed such terms as positive and negative, transparent, translucent and opaque, sensitive solution, etc.

In all of the applications of mathematics, English, civics, science and geography, the teacher should endeavor to confine himself closely to the subject matter included in the various courses of study. The field is so wide, particularly in science, that it is rather difficult to keep at the boy's level. Close co-operation, both as to principles presented and methods of presentation between departments, will aid greatly.

In conclusion, we should say that the work on charts and schedules, the applications of science, English, etc., do not form the major part of the course of study in trade drawing.

The addition of vocational work is to enable the school to more effectively realize the aims of vocational guidance and trade training. The draughting room should give the boy a knowledge of what qualifications are necessary for success in this line of work, the conditions under which the work is usually done, rates of pay, chances of advancement, etc. It should give him considerable skill in expressing and interpreting the language of drawing.

In the majority of cases that have come under my observation, the boy does not follow the work beyond the prevocational stage. Acquiring technique is not, then, as important for most boys as a knowledge of how to read drawings, the uses to which they are put, and the information he has received thru correlation with academic subjects.

Whether the boy enters a trade or becomes a business or professional man, the familiarity with drawing will always be of value to him and he will be a better mechanic or a broader business or professional man.

The Model School Dress as an Eighth-Grade Problem

Edna J. Benson, W. Orange, N. J.

THIS problem, no doubt, has been tried before. It has, I think, a permanent value.

The influence of fashion and the present day social conditions tend to destroy our old and established ideals of personal charm. From every side we hear protests against the way the modern school girl dresses. This is felt particularly in large high schools where the combined efforts of faculties and parent associations have not met with overwhelming success. They have had speakers who preach dress reform and others who urge the establishment of uniforms. I believe in uniform dress, but not in uniforms. What we want to do is to give the girl a standard by which she may base her judgments of dress. This would be of lasting and permanent value. She would have a standard to judge clothing after she left school and entered other fields of work. Everywhere we go we see the foolish and immodest way the school girl dresses. We become callous to this situation and it is only when criticism in the newspapers is directed toward this situation that we become aware of it.

Our first question is, who is responsible for it? We glibly say it is the fault of parents and the influence of the present day fashions. Both, I think, are correct. I have questioned large numbers of high school girls and even eighth-grade girls as to who selects their clothing and they invariably answer themselves, assisted by their mothers. Have you ever gone into a department store on a Saturday at the beginning of a season and witnessed the hordes of school girls accompanied by their mothers purchasing clothing for the approaching season? Nine mothers out of every ten will say, "Well, choose what you like, I'm not wearing it," and the pretty miss pivots before the mirror to see how the gown enhances her charms. This is only natural. The average mother has a horror of having a fuss and in sheer desperation and fatigue, she bottles up her advice and protests for another time. Only in the rural communities is it the mother who makes the clothing or purchases it without the aid of the daughter.

Naturally it devolves upon the school to accept another responsibility. One point in favor of this is, that a girl always accepts criticism from the outside more readily than she does in the home.

This problem of a model school dress extended thruout the entire term. The actual working out of it occupied the second term but it took all of the first term to get up the right spirit in order to approach the subject with enthusiasm. The task is half completed with the right spirit.

Dresses Nos. I and II.

During the first term we talked about the proper outfit for a school girl. We discussed her hats, coats, party dresses and finally brought up to the school dress. The girls were required to bring in lists of clothing appropriate to the needs of the average school girl. Another thing that gave impetus to the work was the gathering together of examples in bad dressing. The girls watched the business girls on the way to school and found many illustrations of the lack of good taste. There is no critic as severe as a very young girl. They were keen on this phase of the work and when we concentrated our attention to the model dress for school, the girls had a splendid working knowledge of what was good and bad.

They were given their choice of both pattern and material to fit their individual

needs. The materials selected were gingham, chambray, poplin, percale, linen, Indian head, galatea and kindergarten cloth. The girls were unanimous in their approval of the middy blouse and dark skirt. The one-piece dress was a close second. Before purchasing their materials and patterns they had to submit a sample of material and the illustration. If these were approved, they brought them for the next lesson. We used commercial patterns and they were not limited to any one kind. Simple lines and little or no trimming were closely adhered to. The simple one-piece dress had many followers. They were urged to do away with as many plaits as was possible on account of the difficulty of laundering, but this was rather hard because they loved the plaits.

Collars and cuffs usually were white and the decorations were bias bands of the dress material, hand scalloping, hemstitching, feather stitching and other decorative stitching.

Dresses Nos. III and IV.

The classes ranged in size from sixteen to 22. Each girl measured and cut her own dress from the commercial pattern. The period was one ninety-minute period a week and we cut on the average of about ten dresses to a period. As they did not bring them all on the same day, there was no delay or confusion. A few came after school. We worked on the large pieces first, such as skirt or waist, and later assembled the small ones and did the finishings. This last was the hardest of all as they were apt to hurry over what seemed to them the unimportant things. Close supervision was necessary over the buttonholes and the sewing of snappers.

As an incentive to the work, the Improvement League, headed by Mrs. Thomas Edison, offered prizes. There were three competent judges appointed for the contest and they based their judgments upon economy, durability, appropriateness to the occasion, hygiene and whether they were artistic in line, color and design. These things were closely observed in the planning and making of the dresses.

Illustrations I and II were first and second prize dresses respectively, while III and IV were two of the eight honorable mentions. First and second prize winners each received two dollars, while one dollar was awarded to each of the honorable mentions. Another year it is planned to award medals.

Illustration I was a navy blue kindergarten cloth made after the one-piece slip-over model, box plaited to a double yoke. The latter was a good point, as much wear comes on this part of the dress. On pockets, collar and belt a line design was run in tan mercerized cotton, the same cotton being used in the construction of the string drawn thru embroidered eyelets. There were no fasteners apt to come off on this dress.

The second prize dress was made of dull rose poplin with white collar, cuffs and belt. A dainty touch was the little white buttons on which the rose touch was repeated. The saddle bag pockets put it in the first ranks of fashion.

Number III was pink chambray, the fine shirrings defining the waist line. Collar and cuffs were white, buttons crystal and feather stitched braid outlined the yoke and hems of the gathered pockets.

A pink and white striped gingham was used for Number IV. There was a delicate green in the pink stripe and the pink was emphasized by pink chambray collar, cuffs and belt.

This work was considered by the school authorities to be of distinct value and the girls were proud of their achievements and felt as if they had accomplished something definite.

All the way thru this work we kept it clearly in mind that we were making our business dresses and they had to meet certain definite requirements. All transparent materials and gaudy colors were tabooed, as were lace and other perishable materials.

By this definite problem, I feel that we accomplished more than the usual eighth-grade non-vocational class, and that the girls have formed a standard, small tho it be, upon which to judge their clothes in future.

ANALYTIC TEXTILE WEAVING

GRADES I THRU IV

Miss S. E. E. Hammond, Assistant Supervisor of Art and Handwork, Springfield, Mass.

THE following course is founded largely upon individual observation, recording, and certification of the process of weaving by the pupil. This necessitates the use of the development method in the presentation of the lessons.

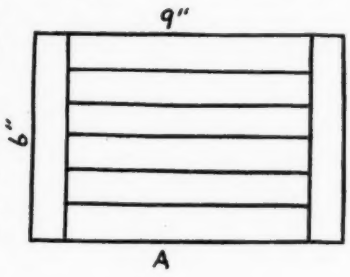
In the first one or two lessons in each grade the child is led thru conversation and questions to discover the sources and development of clothing from the early stages to the present. He traces it from the primitive use of skins, with and without fur, and the making of clothing from grasses and vegetable fibers, thru the weaving of textiles from cotton, wool, and silk. The extent to which this is developed depends on the age of the pupil. After this has been developed, each child is given a small piece of matting, sacking, burlap or denim from which he discovers, by raveling his sample, the warp and the woof, and how the woof is put into the warp to form the simple and diagonal weaves. He records this on squared paper, using black crayon or pencil. Thus far nothing has been said concerning color. The arrangement of the colored threads is now observed in chambray and striped, checked and plaid gingham and this is recorded on the squared paper in the color found in the textile. These records with the samples of the textiles used are mounted on 9″x6″ papers and bound in book form.

The complete course is as follows:

Grade I.

1. Child learns to weave with colored splints and oil cloth mat.

2. (a) Color 9″x6″ paper with colored crayon. Divide this into strips by ruling lines across the 6″ width of the paper. The space between the lines should be the width of the ruler. Cut this in strips, cutting on the lines.



(b) Cut mat from 9″x6″ paper as shown in illustration I.

(c) Weave in colored strips.

3. Draw picture of woven mat on 9″x6″ paper.

4. By conversation and questions develop the sources of clothing as suggested above.

5. (a) The child is given a small piece of matting. By raveling he first discovers and learns the difference between the warp and the woof; second how the woof is put into the warp.

(b) He is then given one-eighth of a 12″x9″ paper which is checked off in one-half inch squares. On this he puts in the warp by drawing with black crayon on the blue lines the *long* way of the paper. He puts in the woof by drawing with black crayon on the blue lines *across* the paper, representing the simple weave,—over one, under one, as shown in Illustration II.

(c) Mount sample and record on 9″x6″ paper.

6. (a) The child discovers by untwisting and pulling apart a thread of textile that it is composed of small parts.

(b) He then is given a small piece of cotton batting which he twists and spins into a thread.

(c) A small piece of cotton batting and the spun thread are mounted on 9″x6″ paper.

7. (a) He is next given a small piece of chambray. By raveling he discovers the warp is a color and the woof white.

(b) He records this on the one-half inch squared paper, (as in illustration II), using the color of the chambray for the warp and black for the white woof, showing the weave.

(c) Mount sample and record on 9″x6″ paper.

8. Fasten all together in book form, using a simple cover.

Grade II.

1. By conversation and questions develop the sources and development of clothing.

2. Same as No. 5 in Grade I, except that burlap is used instead of matting.

3. Same as No. 6 in Grade I, only finer spinning.

4. Same as No. 7 in Grade I, except $\frac{1}{4}$″ squared paper is used.

5. Child given a small piece of cotton textile, even stripe, simple weave. (a) Discover warp not all one color but in strips and woof white.

(b) Record weave on $\frac{1}{4}$″ squared paper with black crayon, making the warp four squares long. See Illustration III. Draw picture of stripe below, using color of stripe.

(c) Mount.

6. The child is given a small piece of cotton textile, uneven or bisymmetric stripe, *one* color, simple weave.

(a) Discover weave, color, and arrangement of stripes. See Illustration IV.

(b) Record weave, color, and arrangement of stripes.

(c) Mount.

7. The child is given a small piece of cotton textile, uneven or bisymmetric stripe, *two* colors, simple weave. (a) Discover weave, color, and arrangement of stripes.

(b) Record weave, color, and arrangement of stripes.

(c) Mount.

8. Fasten the mounted records together in book form.

2. Same as No. 2, Grade II, but use pencil and leave margin.

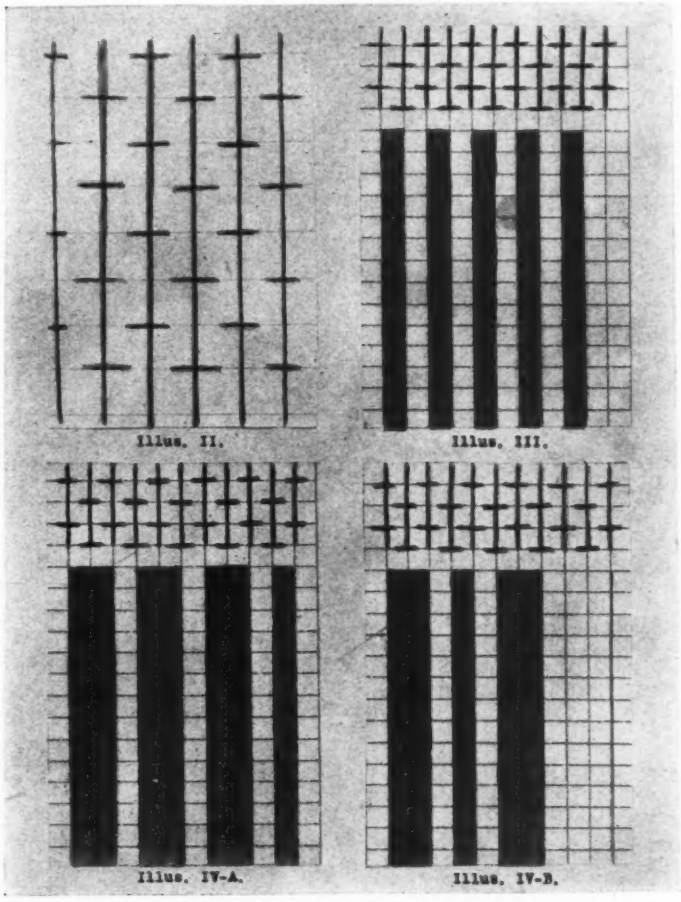
3. Same as No. 3, Grade II.

4. Same as No. 4, Grade II, but use pencil and leave margin.

Note. For the remainder of the work in this grade use $\frac{1}{8}$" squared paper, one-eighth of a 12"x9" sheet.

5. Sample of material should be even stripe, cotton textile, one color and white. (a) Discover color and arrangement of warp.

(b) Discover color of woof.



Illus. II. Illus. III.

Illus. IV-A. Illus. IV-B.

9. Give the child a 6" or 7" square cut from some coarse material as burlap or sacking. After drawing a few threads on each of the four sides one inch from the edges of the square one or two threads of yarn of harmonious color may be woven in as border of mat.

10. This work may be followed with the construction of a clothing or dry goods store.

Grade III.

In using $\frac{1}{4}$" squared paper in this grade, leave a margin of two squares at the top and sides and three squares at the bottom. Use pencil instead of black crayon.

1. Same as No. 1, Grade II.

(c) Discover weave.

(d) On $\frac{1}{8}$" squared paper place the figures "1" thru "9" as shown in Illustration V. These figures show the position of the threads of warp. Draw threads of warp 10 squares long, the color of the stripe, under 1 and 2. Leave 3 and 4 blank as they represent white threads. Under 5 and 6 draw colored threads of warp. Leave 7 and 8 for white threads. Draw under 9 a colored thread of warp. These threads are all ten squares long.

We are now ready to put in the woof. Use pencil. Represent the woof passing over the first thread, under the second, over the third, under the fourth,

over the fifth, under the sixth, over the seventh, under the eighth, and over the ninth thread. The second thread of woof, of course, starts under the first thread of warp. Continue until all ten squares have been used.

Leave four rows of squares below this weave and draw a picture of the even stripe, using color of the stripe for the colored stripe and the paper for the white stripe.

(e) Mount.

5. Even or uneven stripe of cotton textile of two colors.

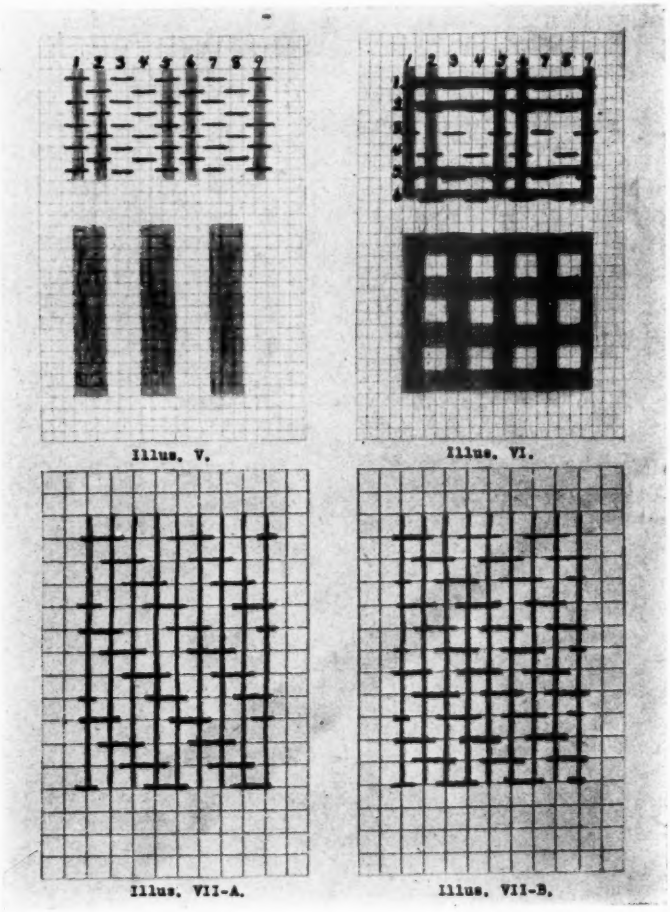
(a) Discover balanced stripe, color of warp and woof.

(b) Put in a few threads of warp to show the color and arrangement of the stripe and threads of the woof to show the weave. Draw picture of stripe below.

(c) Mount.

8. Simple check, one color and white. (a) Discover color and arrangement of warp and woof and kind of weave.

Prepare paper as in Illustration VI. These numbers show the placing of the threads of warp and the threads of woof.



Illus. V. Illus. VI.

Illus. VII-A. Illus. VII-B.

(a) Discover color and arrangement of warp.

(b) Discover color of woof.

(c) Discover the weave.

Prepare paper as in Illustration V.

(d) Draw in threads of warp in proportion to the stripe. If colored stripe is wider use three threads of colored warp and two threads of white warp. Show the simple weave and draw picture of stripe below. See Illustration V.

(e) Mount.

7. Balanced or bisymmetric stripe. Prepare paper as in Illustration V.

(b) Put in two colored threads of warp.
Leave two white threads of warp.
Put in two colored threads of warp.
Leave two white threads of warp.
Put in one colored thread of warp.
Put in two colored threads of woof.
Leave two white threads of woof.
Put in two colored threads of woof.

Show the simple weave by drawing the pencil line at the lower edge of the woof thread to represent

the thread passing over and under the warp threads. See Illustration VI.

Leave three rows of squares and draw a picture of the check below.

(c) Mount.

9. Check in two colors and white. (a) Discover weave, arrangement, color of warp and woof. Prepare paper as in Illustration VI.

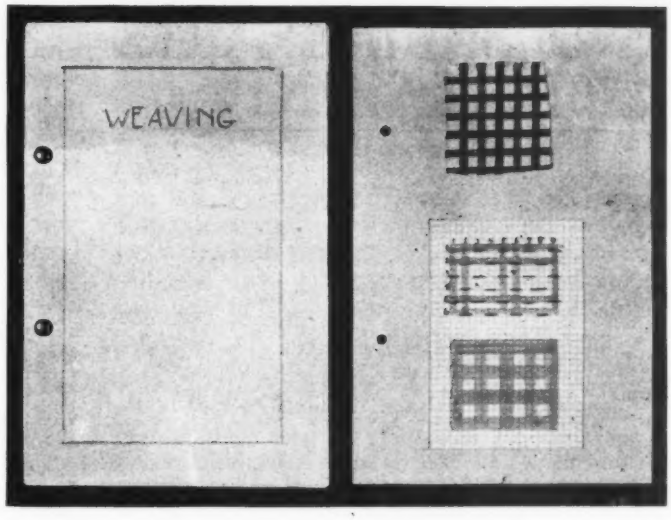
(b) Put in warp, woof, and weave. (See Illustration VI.) Leave three rows of squares and draw picture of check below.

(c) Mount.

10. (a) Have child draw an original check, planning carefully both as to arrangement and color. His design should cover the entire surface of the paper.

(b) Mount.

11. Fasten the mounted records together in book form.



A Cover and a Page of a Child's Record Book.

Grade IV.

1. Discussion and questions on development of materials for clothing.

2. Spinning wool. (a) The child is given a small piece of carded wool which he spins into a thread by twisting it in his fingers.

(b) Some of the wool and the spun thread are mounted on 9″x6″ paper, in the same manner as the cotton spinning.

3. Denim or plain wool serge. (a) Discover diagonal weave.

(b) Record on $\frac{1}{4}$″ squared paper, using pencil. (See Illustrations VIIA and VIIB.)

(c) Mount.

4. Balanced or bisymmetric stripe in one or two colors, in cotton or wool simple weave.

(a) The child studies it in the same manner as No. 6 in grade III. Use $\frac{1}{8}$″ squared paper.

5. Same as above but diagonal weave.

6. Plaid, simple weave. (a) Discover weave, color, and arrangement of warp and woof. Prepare paper similar to "check" in grade III, No. 7.

(b) Put in a few threads of warp arranged in proportion to the colors of the warp threads. Put in a few threads of woof in proportion to the colors of the woof threads. Show the weave similar to "check" in Grade III, No. 7. Leave three rows of squares and draw picture of plaid below.

(c) Mount.

7. Plaid, diagonal weave. Develop the same as plaid, simple weave No. 6, but show diagonal weave.

8. (a) Have child draw original plaid, planning carefully both as to color and arrangement. His design should cover the entire checked surface.

(b) Mount.

9. Fasten the mounted records together in book form.

WAR ECONOMY!

Economy in the use of lumber and other materials used in school shops is a patriotic duty imposed by the military preparations of the United States. Manual training men can render a valuable service by devising shop exercises and projects which consume a minimum of materials. The INDUSTRIAL-ARTS MAGAZINE will be pleased to receive and consider for publication, suggestions, drawings, etc., of successful, economical problems. Successful "War and Red Cross Problems" are solicited.

Address the Editors at Milwaukee.

INDUSTRIAL-ARTS MAGAZINE

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EDITORIAL

UNIVERSAL SERVICE.

THE events of the last few months have revealed the real spirit, vigor, and dynamic temper of the American people when a big emergency job has been set for them to do. Life at once becomes tense; non-essentials are put aside; energies are all bent to one purpose; red tape is not tolerated for long; energy, and time, and facilities, and abilities, and money, and life are all conscripted. Every person must take his place where he can render maximum service. There must be no slackers. In other words, under the stress of a great national crisis, we have adopted the policy of universal service.

When the war is over, we may or may not retain universal *military* service as a permanent policy of the government; but that we shall have *universal service*, there can be no doubt. The business of *living* is going to become just as big a job, calling for the same spirit and vigor and the same conscription of forces and resources, as the business of killing. The loafer in time of peace is going to become an object of as great contempt as the slacker in time of war.

There will be more work and fewer hands with which to do it. The period of reconstruction necessitated by the fury of autocratic greed will demand every energy, call forth the highest thought and skill, and put to the supreme test every resource of American genius.

This new condition will inevitably call for a new type of education or else a radical modification of the inherited leisure-class type. Stratified education must pass away with ossified autocracy. They belong to one and the same category and deserve the same fate.

Democracy will be enthroned when the spirit of service and good will shall have permeated all human relations; and when education for all the people shall have adopted "Effective Service" for its slogan.

In the light of recent developments, the public is going to demand certain very radical readjustments in the schools. Courses of study are no longer to be accepted on faith that perchance, sometime, somewhere, and in some mysterious manner, they may be of some service to somebody. This old-fashioned type of education based upon the exploded theory of formal discipline, is about as logical as the action of the farmer who stands on his front porch and tosses his seed corn into the air in the hope that some benignant breeze may carry it to a prepared and fertile field. It ought not and probably will not survive the present conflict.

The schools should welcome such an opportunity to take on the spirit and attitude of the real world of affairs. Such readjustment will drive away stagnation and that easy-going, complacent attitude. It will substitute for these, purposeful effort and that "up-and-coming" attitude that means service and achievement.

May the schools take up the cry of "Universal Service" in its best and broadest application.

COMMON VALUES IN THE MANUAL ARTS.

FIFTY manual arts teachers of Illinois responded to a questionnaire sent out recently by a committee appointed to investigate methods of grading high school work.

The questions were directed to find the relative average importance which teachers of the manual arts place on seven qualities which the committee thought essential.

These qualities and the average percentage of importance ascribed to them are Accuracy, 26.7; Rapidity, 11.03; Concentration or Application, 20.5; Neatness, 11.7; Ability to Plan or Design, 11.9; Improvement, 10.9; General Conduct, 6.8.

Of course it is not possible for teachers to grade manual work in exact percentages even if they could agree on a list of qualities and proportions as most desirable, yet such an investigation if carried far enough has value in finding and emphasizing the relative values in the minds of teachers with regard to their work.

It should, for instance, be of interest to teachers of the manual arts to know that the majority place first importance on Accuracy in work and Concentration on work.

The report is of especial interest, however, in the variety of importance manual arts teachers place on the several qualities.

The replies on Accuracy varied from 15 to 40 per cent, on Rapidity from 5 to 35 per cent, on Concentration from 5 to 40 per cent, on Neatness from 5 to 30 per cent, on Design from 5 to 25 per cent, and on Improvement and General Conduct from 5 to 20 per cent.

It is difficult to believe that teachers of any other school subject would differ so much in their judgment of the relative importance of several qualities in the work of pupils.

These qualities represented purpose and the variety of purpose suggests a lack of definite established purpose on the part of teachers.

If the manual arts are to become a "Keen edged tool of education" the purposes and the methods of attaining them must be standardized.

TAKING ADVANTAGE OF THE SMITH-HUGHES LAW.

THE almost universal acceptance of the provisions of the Smith-Hughes law by the states is very gratifying indeed. It is very noticeable, however, that in many places the great emphasis has been placed upon the fact that the government has appropriated a *large amount of money* which may be secured by the states thru certain legislation or executive order.

In some places, at least, there has not been manifest a corresponding interest in the character and need of the type of work contemplated by the framers of the national law. In such places, the machinery for putting the law into operation has been placed in the hands of already existing educational agencies that previously had shown no signs of life, much less of activity, in the realm of vocational training. In such instances, the supervision has been placed, as was of course to be expected, in the hands of people who have had no contact whatever with the actual world of industry.

Such a situation makes an ideal condition for inevitable and complete failure from the standpoint of vocational education. We are prepared, therefore, to witness in such cases, a revival of "tool process" manual training and similar work in other lines based upon the time-worn considerations of "general education" and "cultural values."

We give it as our humble opinion that the Smith-Hughes law and its national administrators contemplate such definite courses of work under practically trained artisans as will prepare students speedily and well for entrance into profitable employment. And we shall be much surprised if the old-fashioned "tool process" manual training for "cultural purposes" can be glossed over by theoretical, but industrially inexperienced, people and made to meet the requirements for national aid.

This is not a discussion of manual training as it now exists in the schools. Neither is it a discussion of the wisdom or unwisdom of the Smith-Hughes law. It is solely concerned with the *facts* of the law, the character of the work it very clearly contemplates, and the probable situation that will face those who desire to profit by its provisions. Our advice is to accept the law at its face value, to put its provisions into full operation in the spirit of their evident intent, and to watch the consequences.

EFFICIENCY AND AUTHORITY.

A MANUAL training teacher sends the following letter:

"During the past 15 years I have been connected with a number of public school systems in several different states, nearly all of which, in addition to many others which I have visited and observed during this time, seemed deficient in one particular. This is the absence of a certain administrative feature which is characteristic of nearly all other organizations; a proper and reasonable division of authority based upon the principle that any individual should deal on occasions of difficulty or when in case of continued difficulty with his immediate superior, and in case of continued difficulty or continued need, with progressively higher authority.

"My experience and observations are confined almost entirely to small and medium-sized cities, altho I understand that similar conditions exist in larger cities also; and I know positively that there are many schoolmen of larger calibre who fall down in this one particular of business administration; men who burden themselves with a great mass of detail which could be handled by some subordinate fully qualified for such duties. This leads not only to a lack of time for the man higher up to perform the larger tasks which no one else is qualified to perform but frequently leads to misunderstanding, embarrassment, and difficulty among his subordinates.

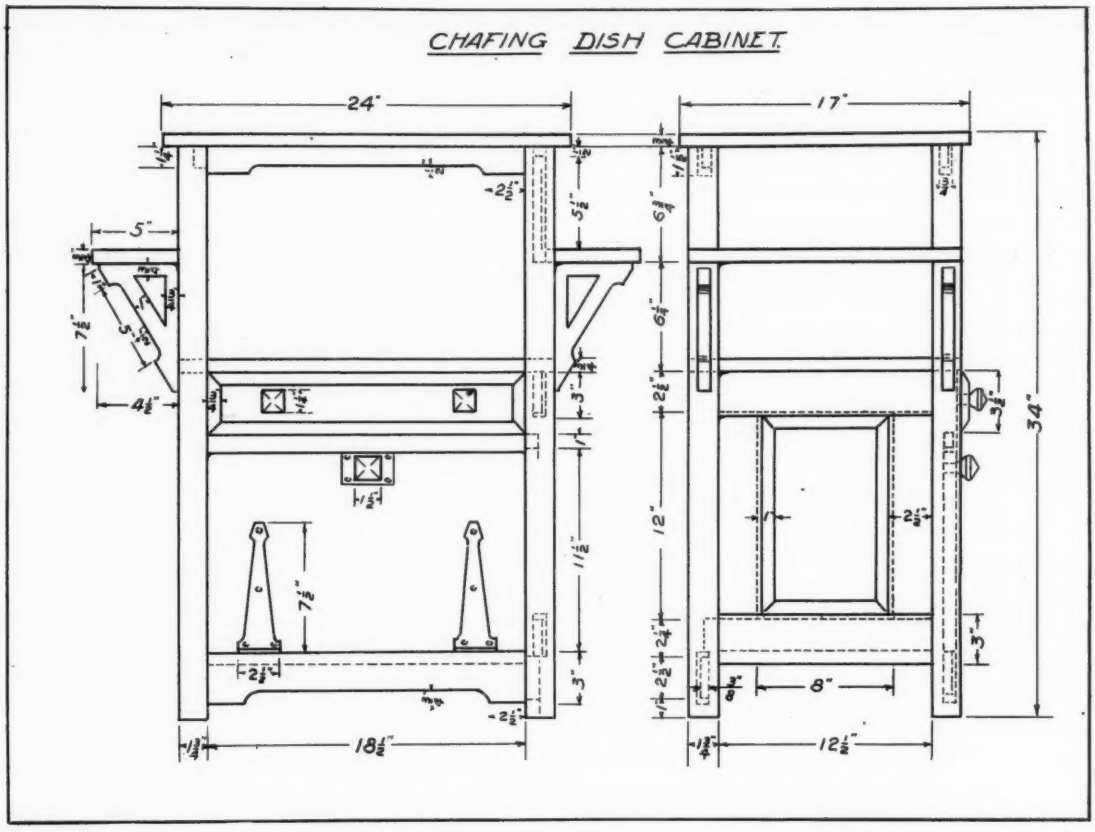
"In a business or manufacturing plant the man at the top has no time for infinite detail, but is represented in the various departments by his immediate subordinates, and they in turn by others, and so on down, with the result that a man is under the direct supervision of his immediate superior and gets his instructions from him. This is not true of the average American public school system and I think it ought to be."

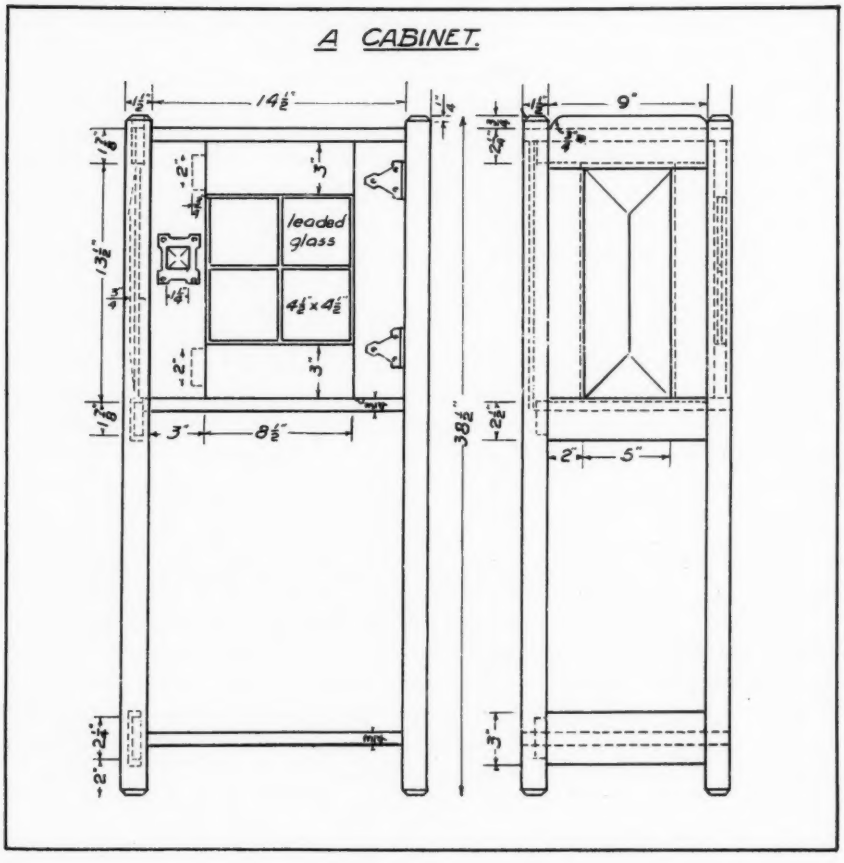
The recent tendency in American school administration has been toward more and more centralization of power in the hands of the superintendent. This centralization has been natural and necessary as a reaction against the diffusion of power which was caused by the practice of school board members in interfering in details of professional management. But the movement has swung far beyond the center of common sense and men of less calibre have interpreted their function to mean minute direction of every classroom detail. It is time that the pendulum swung back and that teachers, particularly men in special work like manual training, were called upon to share in the direction of their own work. At least they should be given credit for the special knowledge and training which they have, and be permitted to exercise intelligent freedom that leads to cheerful planning and healthy growth.

—IN APPRECIATION.

The Industrial-Arts Magazine has been designated as the official magazine of the Boston Manual Training Club for the school year 1917-18. The honor is appreciated especially as it has come unsolicited for the second time.

The fine arts are the complement of the scientific studies and are just as effective and just as powerful. —*Walter Sargent.*





Details of Furniture Designed in the Classes of Mr. Clark Woodward, Murfreesboro, Tenn. See pages 71 and 72.

PROBLEMS AND PROJECTS

The Department of Problems and Projects, which is a regular feature of the INDUSTRIAL-ARTS MAGAZINE, aims to present each month a wide variety of class and shop projects in the Industrial Arts.

Readers are invited to submit successful problems and projects. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing and a good photograph. The originals of the problems in drawing, design, etc., should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

FURNITURE PROBLEMS.

Clark Woodward, Tennessee State Normal School, Murfreesboro, Tenn.

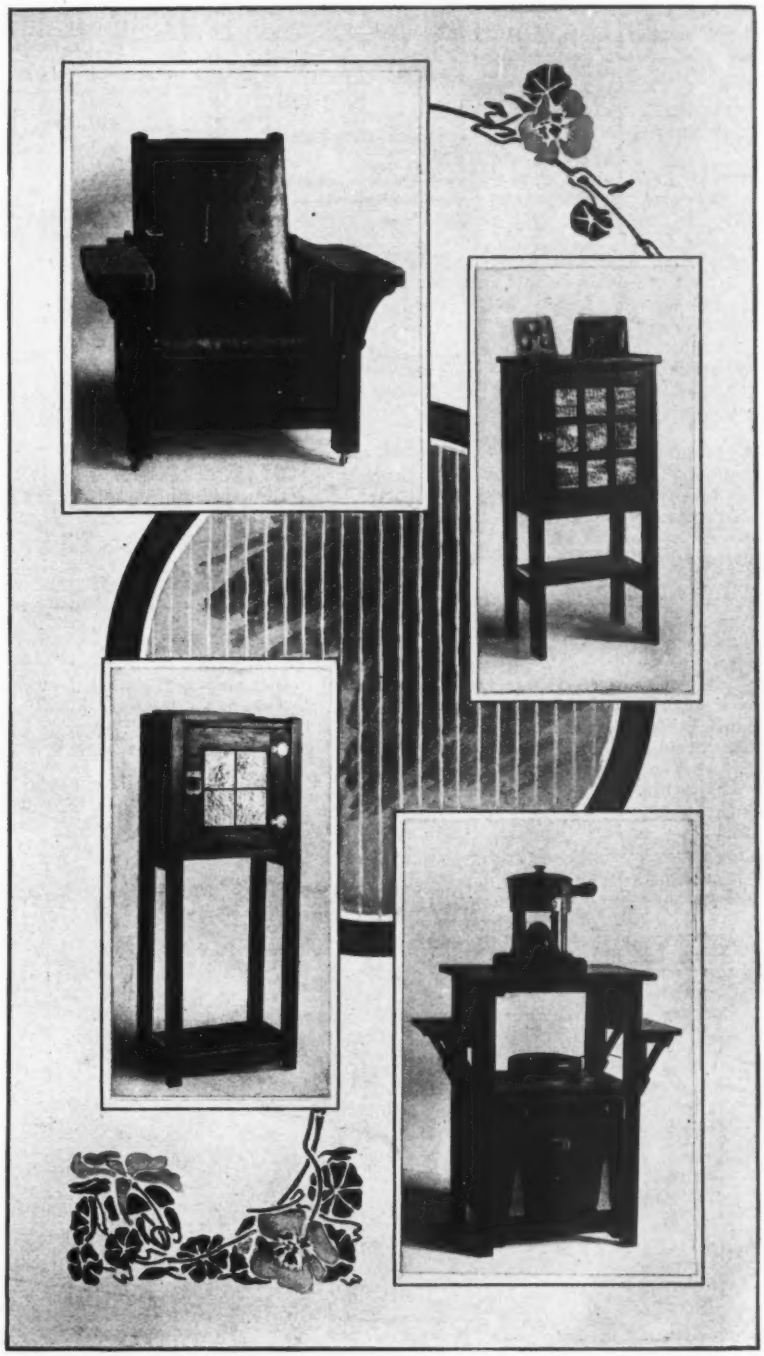
The problems illustrated in the accompanying photographs and drawings were worked out under the author's direction by students in the Murfreesboro State Normal School.

The cabinet, which may be adapted to various uses by special arrangement of the inside compartments, was built, in this particular case, for the convenience of a smoker. It contains internal contrivances such as pipe racks and zinc lined boxes for storing cigars and tobacco. The door is finished with leaded green art glass. The wood is plain oak finished with a forest green wood filler and stained in the color of Flemish oak. The trimmings are of polished brass.

The music cabinet shown is a very effective straight line design. By reducing the depth and fitting it with shelves the design may be readily adapted to accommodate a special set of books such as an encyclopedia.

The art glass in the door is amber and the wood is finished fumed oak. The trim is copper.

The chafing dish cabinet is an interesting and convenient little buffet for a chafing dish or tea service. It is constructed of red gum and finished in a tobacco brown. Copper has been used for the trimmings.

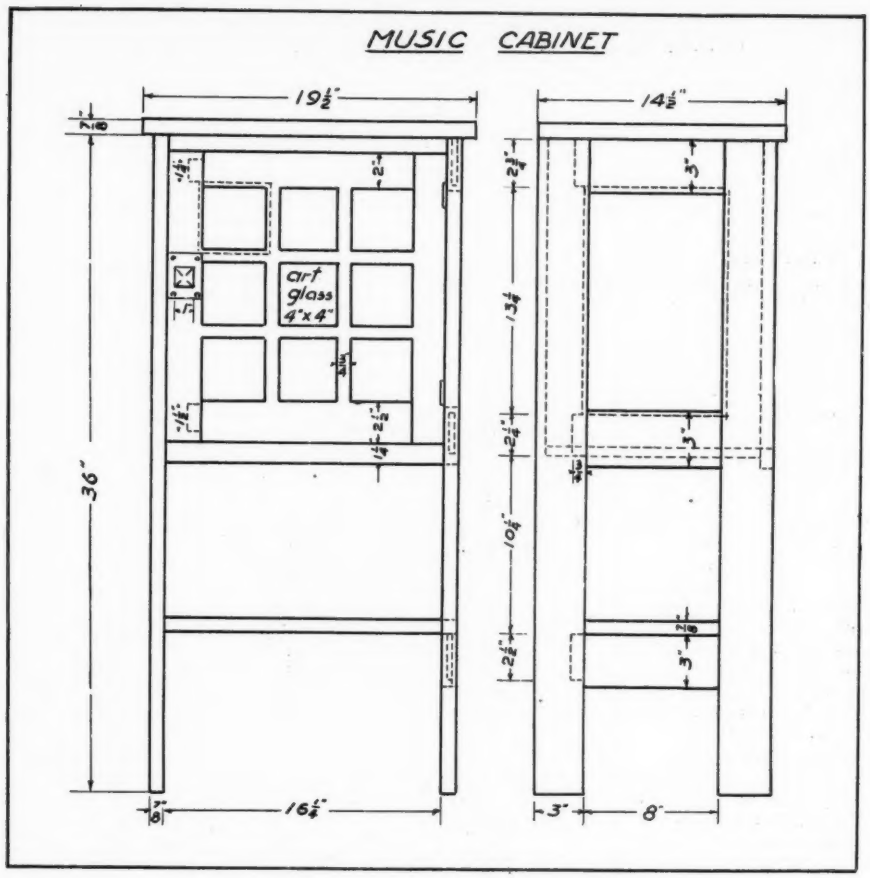


Furniture designed and made in the Author's Classes.
For detail drawings see pages 72 and 74.

FORGING A HATCHET.

Thomas Googerty, Pontiac, Ill.

In forging a small hatchet like the one shown in the drawing, Fig. 1, a piece of 100 point carbon steel is used. The size of stock used is shown in Fig. 2. The first operation is the punching of the eye. In doing this a punch, as shown in Fig. 3, is used. It is simply a long piece of steel drawn out like a chisel. In the punching of the eye the steel is heated and the punch is set in the proper place. Care must be taken to center the eye as this is important in order that equal amounts of stock are on each side. When the punch is in place, it is given a blow with the hand hammer to mark the setting place for the eye. The steel is reheated and the punching is continued carefully to keep the hole straight. In punching from a thick piece of metal, care must be taken to keep the punch cool and some cinders must be put into the hole so that it will not stick.



DETAILS OF MUSIC CABINET. (See page 73).

When the piece is punched to the bottom it is turned over and is punched from the other side. A chisel-shaped punch is used in preference to a thick end punch because the latter would cut away too much of the stock and leave the tool weak on both sides of the eye.

Punching the eye bulges the stock on each side and this bulge should not be hammered back. The bulging of the stock gives the extra thickness across the end of the eye and adds to the strength of the tool.

The piece is now heated and fullered with a ¾-inch fuller to form the top and bottom of the eye, as shown in Fig. 4.

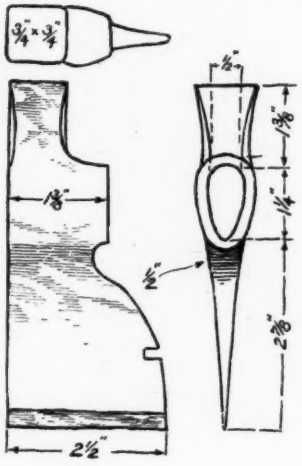


Fig. 1.

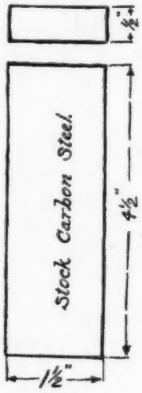


Fig. 2.

The stock for the head of the hatchet is now drawn out as shown in Fig. 5.

The eye is next trued up somewhat. In doing this the eye pin is used as shown in Fig. 6. The pin is driven into the

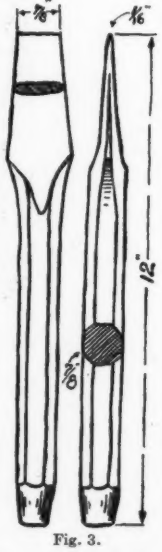


Fig. 3.

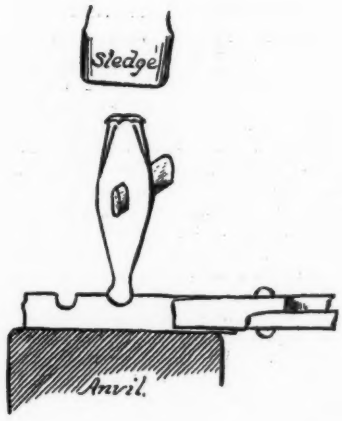


Fig. 4.

eye of the hatchet and the hot steel is hammered around it so as to make a fit. The hatchet should now look somewhat like the drawing, Fig. 7. The blade is next drawn out and care is taken to keep it straight along the front edge and to

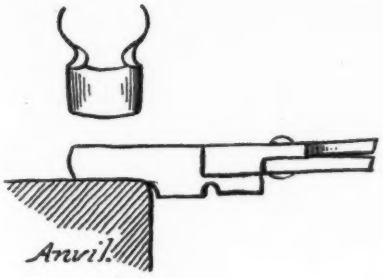


Fig. 5.

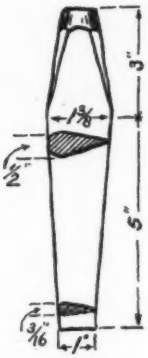


Fig. 6.

let it become as wide as it will. The drawing should be done so as to make the blade wide rather than long. After the blade is drawn out very thin at the cutting edge and the head of the hatchet has been straightened, the pin is carefully driven into the eye. The eye should now be made the right size, by driving the pin thru both ends of the eye, using a vise to hold the hatchet while driving the punch.

The hatchet is then cooled and rough ground on the emery wheel. After grinding it is annealed by heating to a dark red and burying in a lime box to cool. When it is annealed, it is filed and then hardened and tempered. To harden the hatchet is to heat it very slowly to a dark red heat and the cutting part is dipped about an inch and a half in lukewarm, soft water and is kept in motion until cool. The cutting edge should then be rubbed bright with a piece of sandpaper. The head is then cooled. See Fig. 8.

It is then brightened to show the temper color. When a very dark straw color is had at the top and bottom of the hatchet it is cooled again on each end and is set in a dry place on the forge until the whole becomes cooled. When heating the hatchet for hardening, care must be taken to heat it very slowly to an even dark red. If any part becomes too hot the grain of the metal will become enlarged and brittle and the hatchet must be annealed again. When hardened and tempered, the hatchet is ready for the handle.

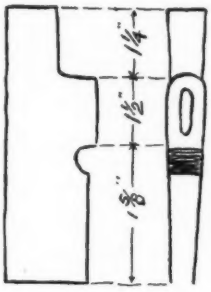


Fig. 7.

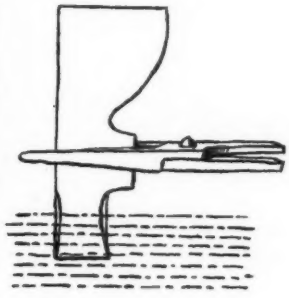


Fig. 8.

A WAR PROBLEM IN MANUAL TRAINING.

Raymond E. Keople, Department of Vocational Education, Rochester, N. Y.

With the advent of the Junior Red Cross work for girls, the boys in the Rochester schools began looking around for some contribution which they might make toward the winning of the war. As a result one of the manual training teachers has worked out a loom for knitting trench or bed socks.

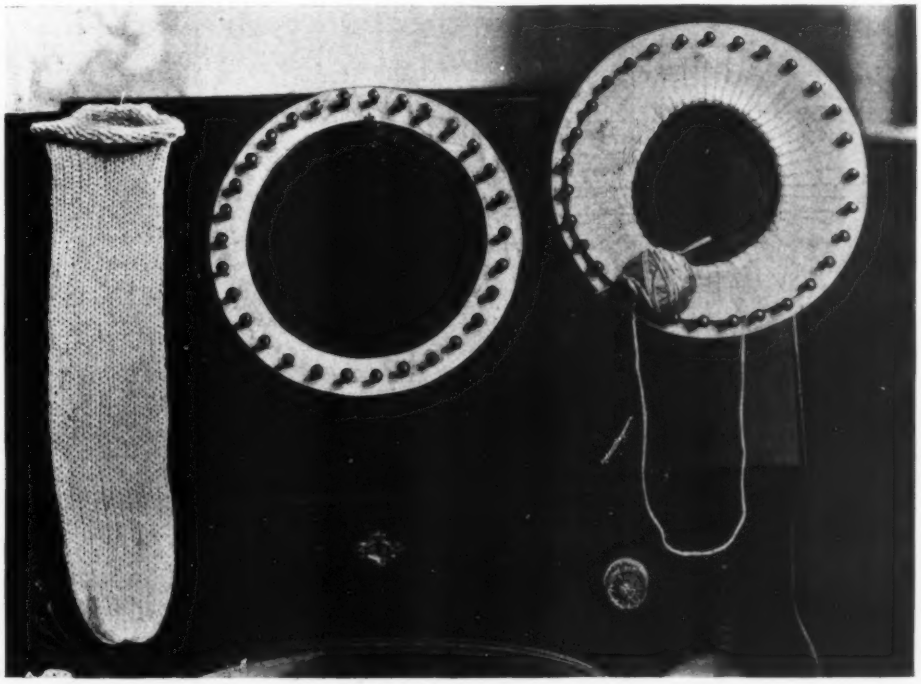
The loom is made from ¼-inch three-ply veneer, or from ½-inch white wood, made by glueing two pieces of ¼-inch lumber crosswise.

Cut a circular piece 10½ inches in diameter, and smooth the edges. From the center of this cut a circle 9½ inches in diameter, and smooth the inside of the ring. The ring may be shellaced or waxed.

The needles may be ¼-inch dowel, round head screws, or brads. If the dowel is used, the ring should be divided into 30 equal spaces, and ¼-inch holes should be bored in the flat side about ¼ inch from the inner edge. Thirty pieces of ¼-inch dowel, 1¼ inches long, are then glued into these holes. Before cutting the dowel the piece should be sandpapered, waxed, and polished in order to give it a smooth surface.

In the head of each dowel is placed a furniture tack to prevent the yarn from slipping off too easily.

The loom is now ready for use. An ordinary steel knitting needle may be used. A tape needle with the head placed



HOSPITAL SOCK AND KNITTING FRAMES.

in a wooden handle, and the flat end heated and slightly curved, will also be found satisfactory.

THE MAKING OF A YARN REEL.

Miss Belle Morrison, Lansing, Mich.

Our department of manual training started to raise a fund for the use of the local knitting unit of the Red Cross.

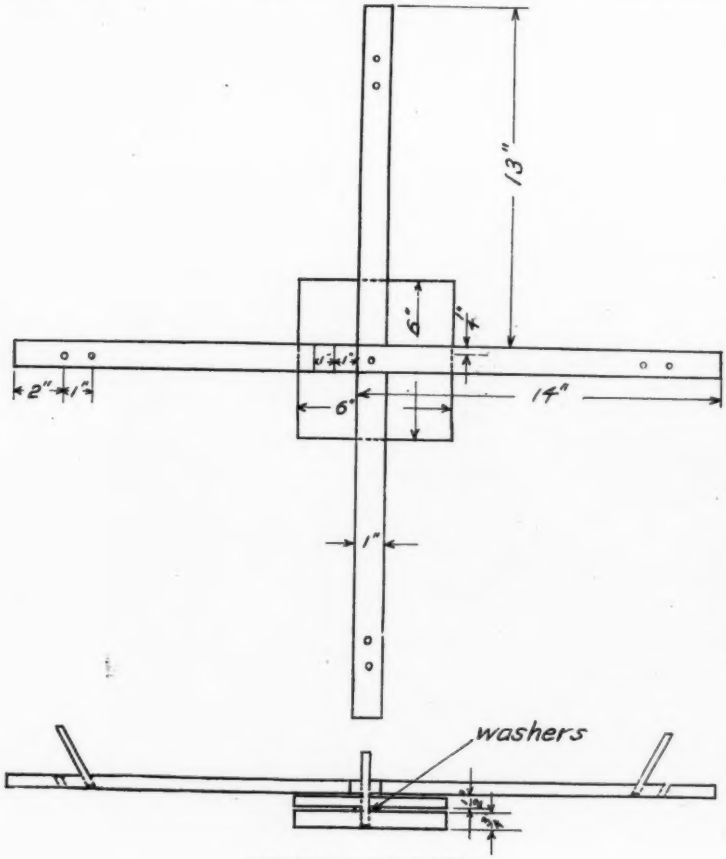
One of the things the knitters needed was a reel, and as those for sale by dealers ran from $1 up to $15, we evolved the accompanying problem for our sixth-grade boys and handled the problem as follows.

There are nineteen sixth-grade classes in the city.

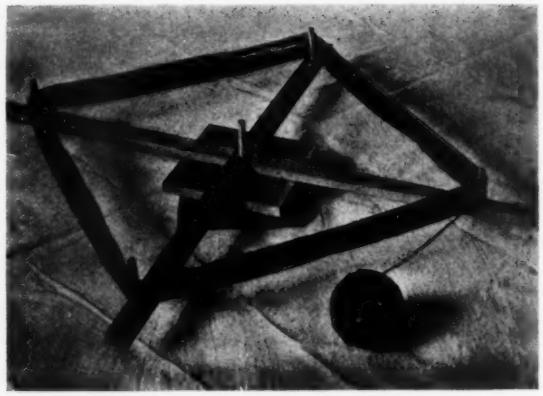
Each class of boys was divided into groups of four boys each with one boy chosen to direct the group. Each boy made one of the arms, three boys making their pieces ½"x 1"x12", and the other one making his ½"x1"x14". One-half inch stock was used and only the edges planed. The ends were made square by careful sawing with the hack saw. Points were located for both nailing and boring. As this was the first time the boys had needed to use a bit and brace, the instructors gave demonstrations of the use of it, and with the boys decided that the central peg must stand at right angles to the board so that the reel might revolve easily, but that the outer holes should slant away from the center to keep the yarn from slipping off the reel. Two sets of holes were bored to accommodate different sized skeins of yarn. These holes were bored nearly thru the pieces.

In getting out the bases the class was given a supply of ½" stock, also ¾" stock. Boys who finished the arms first were allowed to get out a piece of stock a trifle over 6" wide and long enough for either two or three of the 6" bases. This was planed to width, and as we considered block planing these wide ends too difficult for small boys, they were allowed to use the mitre saw to saw these pieces into 6" lengths.

A ¾" hole entirely thru the center of the ½" square and nearly thru the center of the ¾" square.



DETAILS OF YARN REEL.



Yarn Reel.

A 3" piece of ¾" doweling was then glued into hole in the center of the ¾" square at exactly right angles to the board. The four arms were nailed into with 1" nails. Three-inch pieces of ¾" doweling were inserted in the outer holes. Two washers were slipped over the center peg and the reel placed on the top of these.

The children enjoyed working in groups, also the feeling that each had a chance to "do his bit."

TURNING PROBLEMS.

The accompanying illustrations show three turning problems undertaken in the manual training department of the Redwood Falls High School under the direction of Mr. Glenn Lukens, instructor.

A total of thirty lamps were made by the class in oak and mahogany. The boys fitted the electric fixtures and made the wire frames for the shades. The shades proper are of carefully chosen flowered cotton cretonnes, with a shirred covering of dress chiffon or silk marquisette.

The bowl was made of mahogany, stained, waxed and polished. It is fitted with a small glass nappie to hold water. A number of similar bowls were given

Lamp made in class of Mr. Glenn Lukens.

two coats of spar varnish on the inside and have been found to hold water quite satisfactorily.

The vase is also made of mahogany and is fitted with a glass beaker as a flower container.

Bowl and Vase made in classes of Mr. Glenn Lukens.

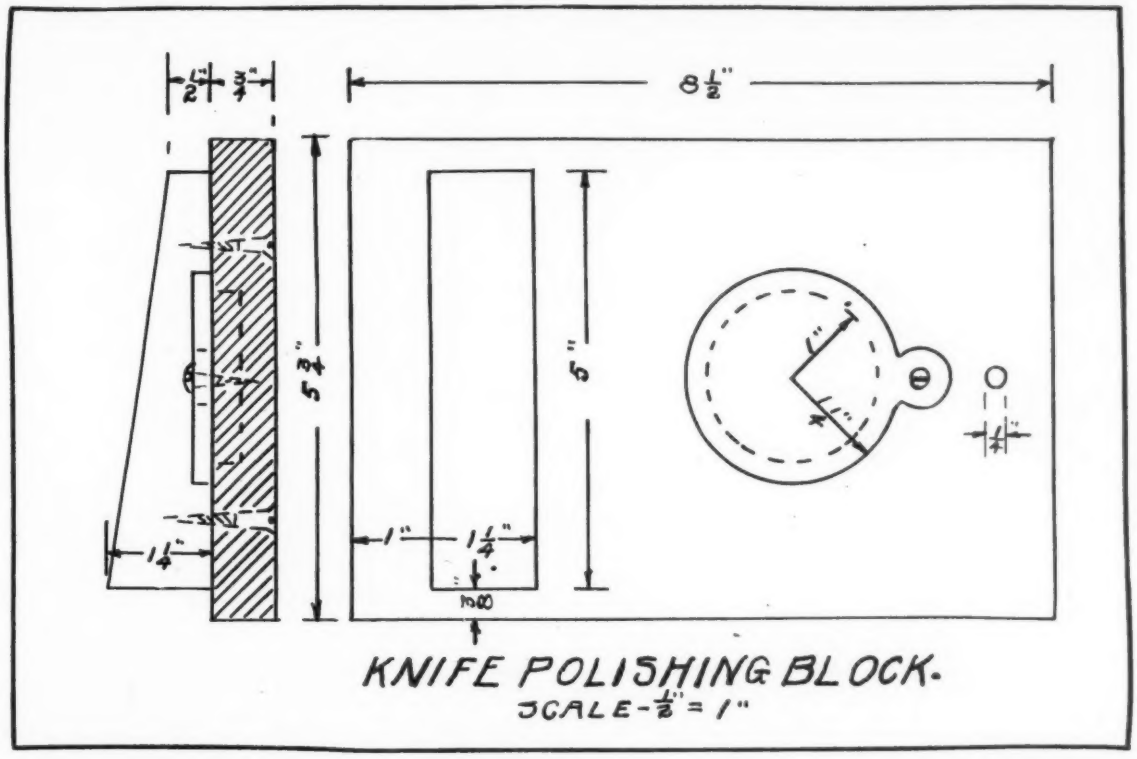
KNIFE POLISHING BLOCK.

Donald V. Ferguson, Director of Manual Training, St. Paul, Minn.

This knife polishing block is the first problem offered in the new provisional course of study in manual training in the St. Paul public schools, and is worked out in the fifth grade. It is a problem in the squaring of stock and has been found to interest the pupils.

The material used is pine, and involves the use of the smoothing plane, saws, marking gauge, brace and expansion bit, drill, counter sink, screw driver, hammer, nail set scoring knife, dividers, try square and rule.

The problem is to be sanded clean and smooth, and is given a finish of two coats of white shellac. In connection with the problem a complete lesson is given on pine.

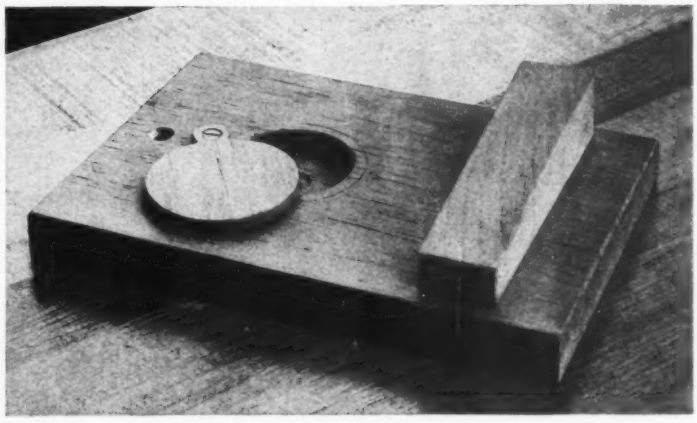


A DANGER.

The teacher who would hasten Educational Preparedness for Failure in Vocational Guidance will rush blindly into this new, untried and dangerous field, will ignore the fact that occupational guidance requires expert occupational information and that such knowledge is apt to change with each industrial change. She will leave a stigma on our public school system which will be more difficult to remove than any similar stain in the history of American education. — *Anna Y. Reed, Seattle, Wash.*

A Suggestion.

A reader of the *Industrial-Arts Magazine*, who is interested in only two lines of work, cuts out from month to month, the articles which he desires to keep for reference and binds them together in compact volumes. Thus he has volumes on reed work, drawing, etc., to which he can quickly refer.



The completed Knife Polishing Block.

FEDERAL AID ALLOTMENTS.

Reaching a total of $811,384.89, federal grants of money to twenty-six states under the Vocational Education Act have been allotted by the Federal Board for Vocational Education. Each of the states has complied with the terms of the law and has agreed to match every federal dollar with money publicly raised by the state or local community. The states are as follows:

Alabama, Colorado, Florida, Iowa, Kansas, Michigan, Minnesota, Mississippi, Montana, Nebraska, North Carolina, Ohio, Oregon, South Dakota, Texas, Washington, Wyoming, Indiana, Connecticut, Idaho, Illinois, New Hampshire, North Dakota, Missouri, Maryland and Vermont.

The payments of Federal moneys to the states are made thru state boards for vocational education and are divided into three general classes: Money allotted on the basis of rural population for the salaries of teachers, supervisors or directors of agricultural subjects; money allotted on the basis of urban population for the salaries of teachers of trade, home economics and industrial subjects; and money allotted on the basis of total population for the maintenance of teacher-training courses.

The approval of the plans of these states brings the total of the states whose plans have been approved up to 40. Only one state has so far failed to accept the provisions of the Vocational Education Act, and the Federal Board is examining and passing upon the plans submitted by the states as rapidly as possible.

The total amount of Federal money available for the use of the states in the promotion of vocational education during the current fiscal year is $1,860,000.

State by state, the latest allotments are as follows:

Alabama	$34,575.42
Colorado	15,000.00
Connecticut	22,902.76
Florida	15,405.79
Idaho	15,000.00
Illinois	93,772.25
Indiana	44,034.97
Iowa	35,829.39
Kansas	27,193.28
Maryland	21,304.56
Michigan	46,048.41
Minnesota	33,793.59
Mississippi	30,912.95
Missouri	53,701.27
Montana	15,000.00
Nebraska	20,434.70
New Hampshire	15,000.00
North Carolina	36,164.85
North Dakota	15,205.99
Ohio	78,815.42
Oregon	15,000.00
South Dakota	15,139.07
Texas	62,325.20
Vermont	15,000.00
Washington	18,825.02
Wyoming	15,000.00

THE STUDY OF COMMERCIAL WOODS.

The study of commercial woods forms a topic in the regular manual arts course for freshmen in the Lyons, Ia., high school. The accompanying illustration shows a group of boys studying a black oak under the direction of Mr. W. W. White, head of the Manual Arts Department.

Mr. White's Class out in the Field Studying a Black Oak.

The work as outlined by Mr. White, includes the identification of 40 varieties of trees and the determination of their characteristics, advantages and disadvantages, common and special uses. During the field trip illustrated, practically every kind of tree which is native in Iowa was found. Several boys studied eighteen varieties for the first time.

SPECIAL WAR DUTY FOR HOME ECONOMICS TEACHERS.

Home economics teachers in the schools are told in a recent circular of the Bureau of Education that a special obligation rests upon them to take an active part in the national food and clothing problems arising from the war. They are in a strategic position, according to the Bureau's circular, which says:

"Teachers of home economics can reach into the homes of the patrons of the public schools and aid in extending a knowledge of food conditions. They can explain the reasons why American families are asked to modify some of their food habits. They can raise food economy to the plane of patriotic service. They can assist families in matters of economy so that better living conditions can be maintained. Of course, all home economics teachers will alter laboratory practices so as to conform to present food conditions, but they may do much more; they may carefully make plain the reasons why America with her abundance of food material asks her people to select carefully, use wisely, and waste not one particle."

The Bureau's circular points out that home economics teachers have already assisted materially in the work of food preservation. They can help further, it is asserted, by taking pupils on "fruit picking" picnics to gather fruit for canning that would otherwise go to waste. This is possible until very late in the fall in some sections. The products of food preservation may be donated to the Red Cross, sent to the soldiers in France, used for public school lunches, or sold for some community project. Home economics teachers can emphasize the cooking of perishable foods and reduce the use of the needed staples.

Sewing courses in the schools may also be modified to meet war needs. "It should be required that half of all class work be done upon old material," says the Bureau. The value in teaching lessons in thrift can not be overestimated.

"Whenever possible articles useful to others rather than to the pupil should be made. This is valuable in establishing among the pupils interest in the great national and patriotic movement of the present time and in suppressing selfishness and vanity.

"There is no particular reason why the student in sewing should carry away the product of her efforts. The instruction is given, as is all other instruction in schools, for training the intelligence and the skill of the student. To rely upon the selfish desire of the student for an article of personal use or adornment to hold her interest is to undervalue the real purpose of the work.

"Students in the seventh and eighth grades and high school classes may sew for the Red Cross on various hospital garments. In this work both speed and efficiency may be developed. If each child who makes a garment is permitted to attach the name of her school and room to the garment she will be more interested.

EASTERN ARTS PLANS.

Mr. Augustus F. Rose, acting president of the Eastern Arts Association, and his associate officers are making wide plans for a strong convention to be held at New Haven, April 4, 5 and 6. The headquarters will be located in the Hotel Taft and the meetings and exhibition will be held in the immediate neighborhood. Mr. Rose intends to make the convention a war convention and to discuss the educational reorganization which must take place in view of the great changes which have taken place in our national life. It is planned to discuss the Smith-Hughes law in its effect on manual training and school art, the work of the national shipping board and all other civil federal war work organizations, the Red Cross in the schools, military training and

farm camp work. It is not planned to hold extensive exhibits but rather to limit these, because of the congested condition of the railroads and the necessity of co-operating with the federal government in facilitating the movement of war supplies.

Complete details about the convention will be prepared during the month of January and will be available to any reader of the Magazine who will write Mr. Augustus F. Rose, care of the School of Design, Providence, R. I.

VOCATIONAL EDUCATION ASSOCIATION OF MIDDLE WEST, CHICAGO, JAN. 24, 25, 26.

The program for the fourth annual convention of the Vocational Education Association of the Middle West promises to be up to the high standard set by previous meetings of this association.

Recognizing that methods of attack for all educational problems of the day must be modified during the present war crisis but that coupled with these modifications must be the constant thought for the future, the program committee has adopted "Re-adjustment" as the keynote of the meeting.

Will the United States find itself as unprepared to meet the problems of peace as it was unprepared to meet the problems of war? True preparedness for this period of readjustment demands immediate and vigorous attention to furthering vocational education. This thought will be the keynote of the meeting in January. The speakers will be recognized authorities in their various fields.

In this convention the association has set itself the task of marshalling all the forces interested for a final drive which will place vocational education "over the top," not only in Illinois but in other states of the Middle West.

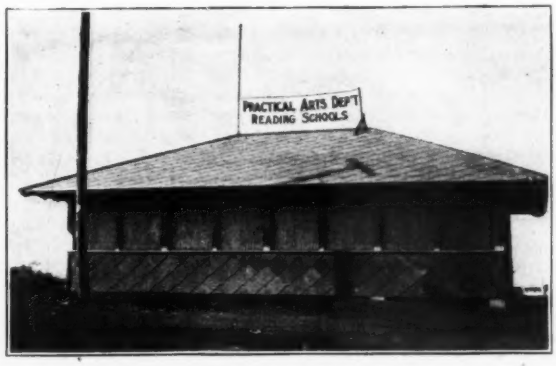
Dr. John Dewey, of Columbia University, New York City, will speak on "Vocational Education in the Light of the World War." Eugene Davenport, Dean of the College of Agriculture, will discuss the labor value of the high school boy in farm work, and the possibilities of vocational education along this line.

Surgeon-General Gorgas is sending Major Wilson H. Henderson to talk on the complete physical reconstruction and training of disabled soldiers. Ruth Mary Weeks, author of "The People's School," whose topic will be "Making American Industry Safe for Democracy," will discuss the preparation of workers for intelligent participation in administration of industry.

Burridge D. Butler, State Director for Illinois of the United States Boys' Working Reserve, will discuss this movement in its relation to vocational education.

T. B. Kidner, Vocational Secretary for the Military Hospital Commission of Canada, will talk on "Vocational Training for Disabled Soldiers."

Others on the program will include Mrs. Helen T. Woolley, Director Vocational Bureau, Cincinnati, whose work has acquired nation-wide recognition; Helen L. Summer, Ass't Chief, U. S. Children's Bureau, Washington, D. C.; Anna Hedges Talbot, State Specialist in Vocational Training for Girls, Albany, N. Y.; Anne Davis, Vocational Guidance Bureau, Public Schools, Chicago; Supt. John D. Shoop, Chicago; Miss Harriet Vittum, Northwestern University Settlement, Chicago; H. W. Kavel, Dunwoody Institute, Minneapolis; R. J. Leonard, Director for the Central States; Dr. Francis W. Shepardson, Director Illinois Department of Education and Registration, and numerous other well-known speakers.



Booth made by Reading Boys.

The above card is one of a set of three issued by the art department of the Central High School, Springfield, Mass. The cards were first designed in charcoal. The color schemes were then established and the final drawings were made in four colors. The cards represent the composite work of several pupils, under the direction of Miss Grace Bell, head of the department. A black and white reproduction does a great injustice to the delicate color harmonies and the splendid presswork of the high school boys.

Complete programs may be had by addressing the secretary, Leonard W. Wahlstrom, 330 Webster Avenue, Chicago, Illinois.

Dr. Chas. A. Prosser, Director Federal Board for Vocational Education, will be present.

Child Labor Committee of New York City will be represented by either Lovejoy or one of the assistant secretaries, Dr. A. J. McKelway or Dr. Edward N. Clopper.

AN INDUSTRIAL ARTS EXHIBIT.

The work of the Reading, Pa., city schools may now be exhibited to the public, annually, in a building which was erected on the new 62-acre grounds of the Reading County Fair Company. In this project the Fair Company allowed the use of all the ground desired and also the choice of a site. The building, which is situated on one of the main boulevards, is 33′x24′ with a three-foot roof extension and conforms in detail to the architectural scheme of all buildings on the grounds. The students pursuing the technical course completed the entire building except the slating. The site was staked off by the seniors, after which groups of technical students from the four classes constructed the forms, mixed and poured the concrete foundation piers, erected all the woodwork, wired the building and painted the woodwork. Each group worked for a period equal to one full day session.

This annual fair was held five days and four nights beginning Sept. 18th. The automatic coin turnstiles recorded that 65,432 persons passed thru the gates on Thursday, the "big day" of the fair.

At the school exhibit the patron could view technical course students turning small rolling pins, mallets and cups on electrically driven lathes; domestic science students of

the high school for girls baking eggless muffins and canning vegetables; other groups of domestic science students sewing and knitting for the war orphans and for their khaki-clad brothers; and freehand drawing students working with brush and color. These exhibits were in operation for three hours in the afternoon, and two hours in the evening.

An attractive part of the exhibit was a space occupied by fresh, by canned, and by dried vegetables, the products of the war gardens of the high school for girls. A part of the floor space was occupied alternately by classes in singing under the direction of the musical directors; classes from the various grades in physical culture and classes of first grade children under the direction of playground teachers giving demonstrations of organized play.—*M. S. Strebig.*

MANUAL TRAINING RESTRICTED.

The New Jersey State Board of Education has issued three new rules which in effect restrict the manual training work in the state to the upper four grades and to the high school. The rules read:

Rule 16. After June 30, 1918, no equipment or supplies for the purpose of carrying out the course of study approved by the State Board of Education in grades below the fifth shall be paid in whole or in part from any portion of the manual training fund.

Rule 17. After June 30, 1919, no part of any teacher's salary shall be paid from said manual training fund who shall be engaged in teaching manual training below said fifth grade.

Rule 18. The State Board of Education will not approve manual training courses of study for grades below the fifth after June 30, 1918, for the conduct of which manual training moneys shall be expended. The State Board of Education, however, stands ready to pass upon the merits of such courses of study in the primary grades upon the request of the local boards of education.

FIRST REPORT OF THE FEDERAL BOARD OF VOCATIONAL EDUCATION.

"The war has fortunately brought home to the country both our need for vocationally trained men and women and our lack of facilities for training men and women vocationally," declares the Federal Board for Vocational Education in its first annual report to Congress, made public today. "The war had, so to speak, found the United States vocationally unprepared."

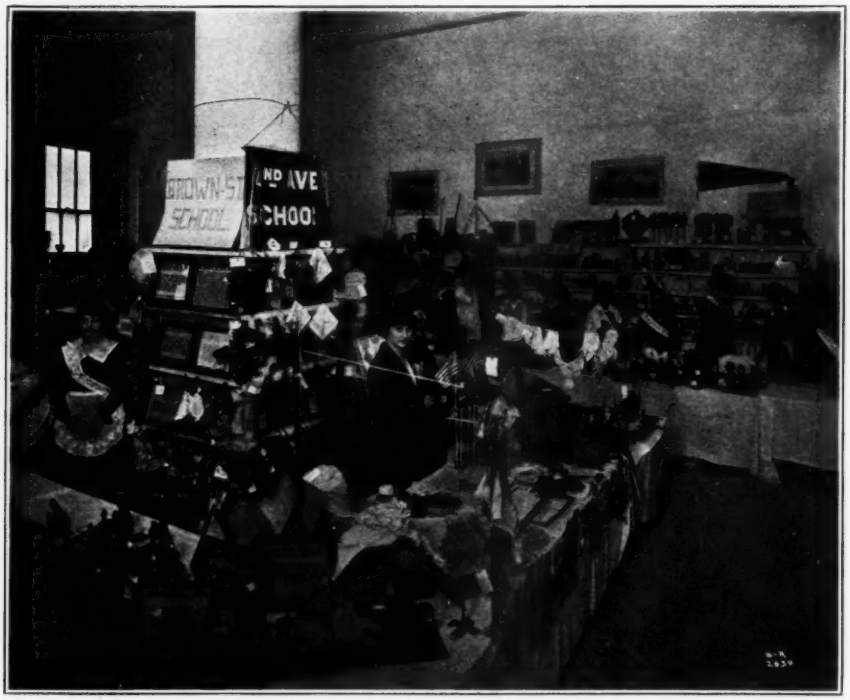
In the four months since its organization the Federal board records the following steps of progress:

Acceptance of the vocational education act by 46 of the 48 states.

Approval of plans for vocational educational systems for 22 states, involving an expenditure this year of more than $850,000 of Federal money and at least an equal amount of state money.

Regionalizing of the United States for administrative purposes and establishing working relations with state school officials.

Publication of a statement of policies.



RED CROSS SALE OF MILWAUKEE SCHOOLS.

Under the direction of Miss Emily Dorn, Supervisor of Drawing, the manual training department of the Milwaukee public schools held a toy sale on December 15th. Four thousand toys made by as many children were made in the 26 manual training centers of the city and were offered for sale. An interesting feature of the work was the attention given to design and color and the close co-operation of the art and manual training departments. The sale netted several thousand dollars which was turned over to the Red Cross.

Co-operation in the establishment of more than 50 night classes to train radio and buzzer operators for the United States Army, with an enrollment of well towards 3,000, and still growing rapidly.

Working out a system of vocational training for the Quartermaster's Corps, the Engineer Corps, and the United States Shipping Board.

"By far the most important event of the twelve months just passed in vocational education," declares the report, "was the passage of the Smith-Hughes Act. This event has marked the beginning of a new era in vocational education in the United States. From now on vocational education is a matter to which the energies of both state and Federal governments will be directed. Its establishment means much for the defense as well as for the prosperity of the people of the country. It means an immediate extension of our secondary public school system so as to furnish practical education for the wage-earning employments. It means, furthermore, that this extension will be carefully planned and ordered. It means an end to haphazard extension of vocational education. It means that a program can be agreed upon and can be developed progressively from year to year."

NOW, ARE THERE ANY QUESTIONS?

This department is intended for the convenience of subscribers who may have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from persons who are competent to answer. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any question and reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Pay for Work.

747. Q.—What should be the proportion of lathes to students in a well equipped machine shop, (a) in ordinary manual training practice, (b) for vocational work?

(c) Is it good practice to pay students for work turned out, putting the shop and the students on a commercial basis? (d) Does this plan stimulate interest and thereby output? (e) Do any schools pay their students in this manner? (f) Are there any objections to this plan?—*S. S. J.*

A.—(a) The proportion of lathes to students will, of course, vary with the type of work which the school is attempting to do. However, we can see no reason for a difference in the proportion in manual training practice and in the vocational school. If the manual training shop is attempting to teach machine shop work so that the student will actually have some marketable skill in machine shop work, it would be accomplishing the same purpose as the vocational school shop. Our estimate would be that there should be one lathe to every three or four students.

(b, c) If work is done for outside establishments for which the school collects pay, the student should be paid something for his work. This is not only just but the commercial standard is an excellent one for the grading of the pupils' work.

(d) The plan stimulates interest and consequently increases the output.

(e, f) Many schools do pay their pupils for their work, but do not pay them the full commercial rate, as allowance must be made for overhead cost, etc. We can see no objection whatever to this plan.

Books on Upholstery.

755. Q.—Would you please suggest some books on upholstering?—*R. M. S.*

A. *Hasluck's Upholstery*, price 50 cents (Funk & Wagnalls, New York), is ample for very simple school upholstery. If a complete manual is desired, *Stephenson's Furniture Upholstering*, price $3.50 (Clifford and Lawton Co., New York), will be found authoritative and modern.

Finishing a Tea-Tray.

758. Q.—What is the best method of finishing a tea-tray?—*E. K.*

A.—If the wood is open-pored, as in oak or mahogany, it will be necessary to fill it with a suitably tinted filler made from a floated Silex base. Wheeler's Patent, made by the Bridgeport Wood Finishing Company, Bridgeport, Conn., is the standard of this type. If the filler cannot be purchased canned, it may be prepared in the shop by using twelve parts of raw oil, six parts dark japan drier and one part turpentine to which has been added enough Silex to form a very stiff putty-like dough. This should be allowed to stand over night and when used should be reduced with turpentine to the consistency of milk. It should be tinted with raw and burnt umber, raw and burnt sienna, rose lake or Van Dyke brown to obtain a shade which will harmonize with the color of the stained wood.

For serving trays I should prefer a water stain followed by sanding when thoroly dry, and a very thin wash coat of orange shellac or white shellac, reduced one-half with alcohol before filling. This last will aid very materially in securing a clear finish, free from the muddiness which sometimes occurs on surfaces not previously coated with shellac. The filler should be allowed to set until free from gloss, rubbed across the grain with a flexible leather pad to force the filler into the pores and cleaned off with cloths, free from lint.

Allow at least 48 hours for this filler to dry before varnishing. This last should be done in a room heated between 70 and 80, free from dust and with the floor freshly sprinkled or mopped. The best varnish, of the many brands which I have analyzed for this work, is Pratt & Lambert's Water Proof Rubbing, which must be ordered direct from the factory at Buffalo, as it is expressly made for this class of work. The varnish as made by Pratt & Lambert, under the name of Water Proof Rubbing, is resistant to heat and cold, rather strong alcoholic solutions and other materials which would tend to injure or destroy varnish in many cases.

It is absolutely necessary in preparing a heat-proof finish of this type that each coat of varnish be allowed not less than seven days to dry in a warm room, with plenty of light, without which no varnish can properly oxidize and harden. Following the week of drying each coat should be rubbed to a good surface following the grain of the wood, by the use of felt pad, pumice stone and water. Pumice stone grade F is about right for this class of work. After the work is rubbed and thoroly sponged and all edges and corners cleaned off with a brush, the tray should be wiped with a chamois skin which has been wrung out dry in water, as a perfectly dry skin will not dry a varnished surface. This method should be followed until not less than six coats have been applied. A heat-proof surface of any quality cannot be obtained with a fewer number of coats.

The last coat should preferably be rubbed with pumice stone and water and after washing clean should be allowed to dry a day or two before polishing with rotten stone and water. Never attempt to polish varnish surfaces immediately after rubbing, for the polish will not remain for any length of time following such treatment. Always avoid the use of oil in rubbing good work, as it tends to produce an inferior finish in spite of much care. After polishing with the rotten stone and water, wash clean, dry slightly and while the surface is still somewhat damp, clean up with a silk cloth and a good oil polish, wiping the surface absolutely dry and free from all greasiness with a fresh piece of silk cloth. The cloths should be washed with hot water and soap after using, as they are much improved with constant use.—*Ralph G. Waring.*

Finishing a Mahogany Writing Desk.

759. Q.—Will you please give me the necessary steps in their proper order for finishing a mahogany writing desk a dark, dull wax finish?—*C. F. K.*

A:—A piece of furniture of the nature of a mahogany writing desk should not be finished in a "dark, dull wax finish," if one is to take it literally, for a wax finish has almost no durability and very little beauty because of its lack of permanency. Furniture of this type receives rather constant and heavy wear, for which reason a finish should be prepared which will protect and render permanent the natural beauties of this wood. For this reason I am suggesting that the mahogany be stained a suitable color by the use of the formulae given in past issues, followed by the sanding after drying of the water stain and a subsequent treatment with a wash coat of shellac which has been tinted slightly with alcohol soluble Bismarck brown in order that the shellac coat may not appear as a gray bloom beneath the varnish coats which follow the filling as advocated in the formula and method given in another article in this issue. From this point on the varnish should be applied in a clean room, well lighted, free from dust, a freshly sprinkled floor and temperature between 70 and 80 degrees. The first two coats should be sanded smooth and free from gloss with 00 or 0000 sandpaper, working at all times with the grain of the wood. Each coat should be dusted thoroly after sanding and the piece should then be carried into the varnish room ready for the next coat, which should be applied with a two or three-inch ox hair or badger hair brush. It is desirable that varnish be allowed to dry from three to seven days, depending upon the amount of time available, and that the third and fourth coats be rubbed with felt pad, pumice stone and water. If it is desired to have a very dull finish, the piece may be sponged with a damp sponge which has been well rubbed with a block of Bon Ami and immediately wiped dry with a chamois skin, being careful to work the hand con-

taining the chamois in perfectly straight lines with the grain of the wood so as to leave a uniform surface on the varnish finish. If, however, a little softer beauty is desired and what may be more pleasing in the end, the desk should be rubbed over with a good oil polish and afterwards wiped dry and free from all greasiness with a piece of old silk. This will produce a finish hard and tough with plenty of brightness to the varnish.

If a wax finish, however, is still the thing to be desired, this is obtained thru the use of the shellac coat, followed by several coats of black wax applied freely and forced into the pores, allowed to harden an hour and then polished to a good finish with a pad made from a piece of new body brussels carpet or a good stiff bristle shoe polishing brush. This finish is as cheap as it is easy to apply and while advocated to some extent by some manufacturers is certainly to be condemned because of its lack of permanent value and the fact that it does not accent nor enhance the beauties of grain and coloring which are peculiar to mahogany.—*Ralph G. Waring.*

A Drum Sander.

760. Q.—In the issue of June, 1917, you give the details of a drum sander. This does not show how much the drum should project above the top of the table. Would be glad to get this information as I expect to build a sander in the near future.—*H. L. C.*

A.—The drum should project from 1-8″ to 3-16″ above the top of the table. The height can be regulated by inserting pasteboard liners under the housing of the main shaft bearing. These pasteboard liners can be taken away or added as the work done on the sander demands.—*R. L. James.*

NEW BOOKS AND PAMPHLETS.

How to Choose the Right Vocation.

By Holmes W. Merton. Cloth, 12 mo, 302 pages. Price, $1.50 net. Funk & Wagnalls Company, New York.

A helpful book that analyzes the mental and moral ability requirements of fourteen hundred vocations. The author holds that efficiency in any occupation is impossible without the right choice of vocation and he urges that all occupational education be accompanied or preceded by an intensive study of the student's competences and incompetences as well as the requirements of the work for which he is fitting himself. Teachers will find the book valuable for reference.

Milling and Milling Machines.

Prepared by experts of the Cincinnati Milling Machine Co. Cloth, octavo, 409 pages. Price, $1.50. Published by the Cincinnati Milling Machine Co., Cincinnati, O.

Teachers of machine shop practice will find this book a complete reference manual of milling practice and milling machines. While the text is wholly related to the machines made by the publishers it is wholly scientific in method and exceedingly clear in presenting standard methods and fundamental principles. The chapters on the mathematics of gear cutting are simpler and clearer than any similar presentation which has come to our notice.

Bugle Calls of Liberty.

By Gertrude Van Duyn Southworth. Cloth, 179 pages. Price, 60 cents, illustrated. Iroquois Publishing Co., Syracuse, N. Y.

This book is a reader of patriotism as its title indicates. It includes selections from great Americans from Patrick Henry to President Wilson and will be found timely.

The Romance of Labor.

By Frances Twombly and John Dana. Paper, 287 pages. Price, 55 cents. The Macmillan Company, New York.

One often hears and reads of the long hours of labor, of the steady strain of labor, of the deadening drudgery of labor. This is rather depressing. Macmillan and Company have published a book, "The Romance of Labor," whose very title is inspiriting. Its contents are selections from English and American authors, masters of their respective subjects. Whatever occupation is used in the plot—lighthouse building, sheep shearing, glass making, log driving, cattle branding, moth collecting—the soul of each occupation which holds and stirs its workers is portrayed with truth and charm.

Standards and Conventions in Architectural Drawing.

By I. G. Koehler, Cass Technical High School. Paper, 48 pages. Published under the authority of the Board of Education, Detroit, Mich.

This pamphlet contains an outline of conventions used in architectural drawing in the high schools of Detroit and the architectural standards which are necessarily used in teaching the subject. The pamphlet is neither a textbook nor a course of study, but it will be found a valuable help to any teacher in bringing his course up to a high standard of efficiency and comprehensiveness. The drawings thruout are the work of a student and afford a ready comparison for quality of lettering and rendition. The pamphlet is the result of the energetic work of a committee of the Detroit Manual Training Club.

Course of Study in Manual Arts.

By Frank S. Pugh, Supervisor of Manual Arts for the Island of Porto Rico. Paper, 126 pages. Published by the Department of Education, San Juan, P. R.

A collection of plates outlining the general character and scope of the problems in mechanical drawing and woodworking to be offered in the seventh, eighth and ninth grades of the Porto Rican schools.

Industrial Art, a War Emergency. By Helen B. Lowry. Published by the Art Alliance of America, New York City. The Art Alliance since its organization in 1914, has helped to bring together the artists and the users of designs. It stands ready to serve as a center thru which the industrial art interests of the country can be co-ordinated. The present pamphlet contains a series of brief addresses on the status of industrial art before and after the war and its special field at the present time.

Desirability of Vocational Education and Direction for Disabled Soldiers. By Elizabeth C. Upham. Price, ten cents. Published by the Extension Division of the University of Wisconsin, Madison. An important problem of the war will be the industrial readjustment of wounded soldiers. In many cases while the man is being trained for his future work, he will be occupied in just the manner that will best aid his recovery from wounds or shell shock. Miss Upham has brought together in this bulletin material from the experience of Canada, which suggests the importance of giving thought to the problem of handling the soldiers who return from the battlefields.

Higher Technical Education in Foreign Countries. By Anna Tolman Smith and W. S. Jesien. Bulletin No. 11, 1917, United States Bureau of Education. The pamphlet is intended to meet the demand of school officers and businessmen of the United States for information in regard to standards and scope of higher technical education in foreign countries. Among these considered in this report are the higher technical schools of Germany, the higher technical institutions of France, the technical departments of universities and colleges, and polytechnic institutions of Great Britain, the Polytechnic Institute of Switzerland, the technical schools and institutes of Italy, the technical schools of Austria, the secondary technical schools of Russia, the higher technical education in Japan provided by engineering colleges as departments of the universities and by special technical schools, and the technical secondary schools, technical and commercial high schools, special technical schools and college and university technical departments of Canada.

Dunwoody Institute Evening Classes, 1917-18. Published by the Press of Dunwoody Institute, Minneapolis, Minn. Probably no technical school in America has grown more rapidly than Dunwoody Institute. Its founder has been dead only a little more than three years, yet the school during the past year had more than 3,400 students in its various classes. The Institute has taken a mechanical census of the state and especially of Hennepin County to find out how the school can best serve the country during the war. It enables the government to select mechanics for its ranks and keeps men where they can serve the country to best advantage. The Institute is also the special recruiting headquarters for the Signal Corps, the Quartermaster Corps, and for the Army and Navy trades. It is also serving in securing and training men for the government arsenals and for private shipbuilding firms. Four motor truck companies have been trained, two of which have gone into service. To date, one radio company, one wire company, one outpost company and one baking company have been recruited and are waiting for the call to duty. The Institute maintains five different types of instruction, namely, day, evening, dull season, part-time, and extension school classes.